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Mineral Industry Report 1978, Northwest Territories

EGS-1983-2

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Northern Affairs Program

Mineral Industry Report 1978

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CHAPTER I INTRODUCTION

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Yellowknife, NWT

This report by the Yellowknife Geology Section of the Department of Indian Affairs and Northern Development describes mineral exploration and the mining industry in the Northwest Territories during 1978. The Non-Renewable Resources Division of the Northern Affairs Program of DIAND monitor mining and hydrocarbon production and mineral exploration in the N.W.T. as these resources are administered by the Federal Government.

The Non-Renewable Resource Division in the N.W.T. consists of the Oil and Gas Conservation Section which monitors oil and gas drilling and production; the Mine Safety Section* which monitors safety in the mining industry; the mining Records Section which records claims, issues permits and administers the Canada Mining Regulations; and the Geology Section which monitors mineral exploration and development, diamond drilling and technical assessment work.

Staff of these four sections comprise 50 persons and expenditure of approximately $1,000,000 in salaries and $1,200,000 in operating funds.

THE MINERAL INDUSTRY: NWT CONTEXT

The Northwest Territories is an immense region with very few inhabitants. It has 1,253,438 square miles of land, 51,405 square miles of fresh waters, 10,000 miles of sea coast and approximately one million square miles of inland sea and continental shelf which are frozen over for 6 to 12 months of the year. Its population of 47,000 is 32% Inuit, 17% Indian, 4% Metis and 47% other. In the Northwest Territories there is only one person for every 28 square miles of land.

Mining and mineral exploration, the dominant industrial activity, employ about 2,000 people full time in mining and as many more, mainly part time, in exploration. Government is the other major employer, providing about 6,000 jobs. As a result about half of the people with wage employment in the Territories work for a government. Traditional pursuits; hunting, trapping, and fishing, are also of major importance, employing most of the native population.

The Inuit population is very young, the average age is approximately 15 years, and the birth rate is one of the highest in the world. Important mineral discoveries in Inuit lands (Fig. I-1) include major polymetallic volcanogenic massive sulphide deposits, (4,5,7) in the Slave Province; an immense Mississippi Valley type lead zinc deposit (2) in the High Arctic; and one of the world's largest low grade iron deposits (3) on Melville Peninsula. Ultimately these deposits will be developed to help provide the employment that will be needed for this rapidly expanding Arctic population.

Important mineral discoveries have also been made in the 74,000 square miles of the Cordilleran Province that lies in the N.W.T. (Fig. I-1).

* *Transferred to the Territorial Government Safety Division in 1981.*

The value of mineral production from the eight mines operating during 1978 (Fig. I-2) is estimated at 316.5 million dollars, $7,623 for every N.W.T. inhabitant. In much of the Territories, particularly the Barren Lands, mineral exploration and mining are the only practical alternative to employment in the traditional hunting-trapping-fishing activities.

HISTORY OF MINING AND MINERAL EXPLORATION IN THE NORTHWEST TERRITORIES

The mineral potential of what is now the N.W.T. came briefly to the attention of Europeans through Martin Frobisher's ill-fated and misconceived attempts to mine gold, which was pyrites, from islands in Frobisher Bay (1576 to 1578). Long before, Indians and Inuit had mined, or probably more correctly, collected native copper in the basalts of the Coppermine River area. Copper artifacts are common in wide-spread Paleo-Indian camp sites east of Great Bear Lake. Rumours of rich copper deposits brought Samuel Hearne trekking northwesterly across the tundra from Churchill on Hudson Bay to the mouth of the Coppermine on the Arctic Sea in 1771. Hearne wandered 5,000 miles, mainly on foot, setting a precedent for generations of prospectors who were to follow. More than 100 years later lead and zinc were found at Pine Point by gold seekers trying unsuccessfully to reach the Klondike via the Mackenzie River system.

The mineral wealth of the Territories lay untapped for 450 years between Frobisher's departure for warmer climes and the discovery of silver-cobalt-radium-uranium deposits at Port Radium on the east shore of Great Bear Lake in 1930. Production was underway in 1934, a year prior to the discovery of gold at Yellowknife. In 1938 the first gold was produced from the Con Mines.

Mineral production expanded slowly as the various Yellowknife discoveries came on stream; Rycon and Negus (1939), Ptarmigan (1942), Giant Mine (1949), Lolor and Akaitcho (1967). Gold production began farther north at Discovery in 1950, Camlaren, 1962, and Tundra, 1964. Rankin Inlet Mine produced copper and nickel from 1957 to 1962; Canada Tungsten Mine began producing tungsten and copper in 1962; Echo Bay began silver-copper production in 1964 and Terra became a silver-copper producer in 1969. Minor production was won from the Rayrock (uranium) Mine (1957) and the Hope Bay (1974) and Norex (1970), silver mines.

When the lead-zinc deposits at Pine Point reached production in 1965 a new phase in mineral developments in the N.W.T. began. Value of yearly production increased almost ten fold and exploration expenditures increased to those of the present.

RECENT MINERAL EXPLORATION

Only one significant base metal find, the High Lake deposit (Fig. I-1) was made in the 1960's.

During the mid 60's important mineral discoveries in the Coppermine River area (1966),

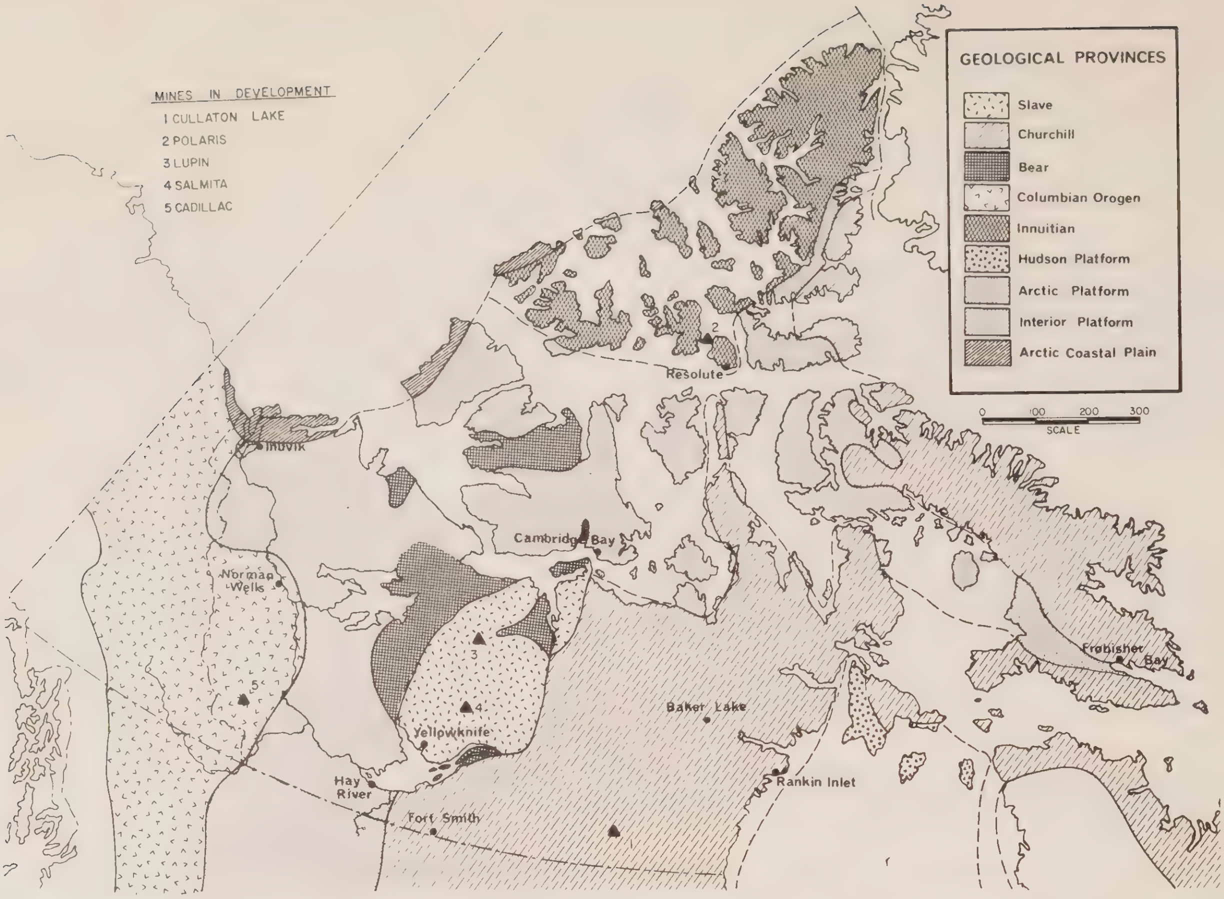

FIGURE I-1: Above - Geological Provinces
Below - District Geologists' Regions

around Pine Point (1965-66) and on the Wollaston trend in Saskatchewan (1968) resulted in extensive exploration for copper in the Coppermine River area (6, Fig I-1), for lead-zinc in the Pine Point area and for uranium in the Keewatin District and in adjacent parts of the southeastern Mackenzie District. During the same period (1968) many hundreds of claims were staked in the Artillery Lake area, north of the eastern end of Great Slave Lake, following release of aeromagnetic maps that defined strong magnetic lineaments along the Slave-Churchill Province boundary. Hopes that a new nickel belt similar to that at Thompson, Manitoba, had been found were not borne out by the ensuing exploration.

With the exception of the Pine Point discoveries, the exploration surge in the 1960's did not locate mineable deposits, and by 1971-72 staking and exploration expenditures had fallen back to only slightly above those of the beginning of the 60's

As activity declined towards a ten year low, the ground work for new base metal discoveries by Cominco, Texasgulf and Canex was quietly being laid in grass-roots programs in the Slave Structural Province, in the Arctic Archipelago and in the Selwyn Basin of the Cordillera. These major discoveries, together with more recent exploration successes, promise to change the stature of mining in the N.W.T.

Between 1971 and 1975 Cominco Ltd. found a number of volcanogenic base metal-silver deposits on their Bathurst Norsemines option on the Hackett River, 450 km (300 miles) northeast of Yellowknife (4, Fig. I-1). When exploration was curtailed here in 1975-76, slightly more than 20 million tons of copper-zinc-lead-silver 'ore' had been outlined in 4 deposits that are amenable to open pit mining. These discoveries, and geochemical-geological reconnaissance that indicated an extensive belt of intermediate and felsic volcanics, resulted in widespread staking for more than 100 km (60 miles) along almost the full length of the Hackett River volcanic belt.

In 1975, 160 km to the west, Texasgulf was drilling an even more impressive find in one of the Itchen Lake volcanic belts (7, Fig. I-1). By 1976 Izok Lake deposit drilling had indicated 12 million tons of high grade copper-zinc-lead-silver 'ore', and two much smaller volcanogenic massive sulphide deposits had been located 40 km to the north in the Takijuq Lake area.

During 1974 to 1976 most of the volcanic belts in the northern half of the Slave Province were staked or taken under permit, and extensive ground exploration followed airborne magnetometer and EM surveys. Exploration expenditures reached new highs as a result, but major new finds had not been announced and by 1978 Slave Province base metal exploration had declined to less than 25% of the 1976 level.

In the Arctic Islands Cominco Ltd. discovered (1971) one of the world's largest Mississippi Valley type lead-zinc deposits on their Bankeno Mines option. The Arvik deposit on Little Cornwallis Island (2, Fig I-1) in the Cornwallis Fold Belt contains approximately 25 million tons, averaging approximately 20% combined lead-zinc, in one massive zone located in the Thumb Mountain Formation along the early Devonian sub-Dissappointment Bay angular unconformity. Smaller deposits and spectacular showings have also been found in the area, but weak markets, a nearly complete absence of infrastructure, and hesitancy on the part of the Canadian Government to agree on the operating parameters for this find have prevented it from coming to production. Exploration, which in 1974 covered four prospecting permits and thirty claim groups, has almost completely died in this region and probably will not be resumed until a production decision can be made.

An even more extensive base metal rush developed in the Cordillera where Canex Placer discovered immense shale-hosted stratiform sedimentary lead-zinc deposits near the east edge of the Selwyn Basin. Although the bulk of Canex's Howard's Pass deposits lie in the Yukon Territory (10, Fig I-1), the exploration surge generated by the discovery spread to the east into the Mackenzie Mountains where targets were carbonate-hosted Mississippi Valley type lead-zinc in Paleozoic and late Proterozoic (Hadrynian) carbonates, and copper-rich beds in Hadrynian clastics. Innumerable showings and many small, rich deposits have been found; but few have any hope of being producers in the present economic climate considering the remoteness of the area and the lack of transportation systems and infrastructure.

Millions of dollars were spent mainly on drill tests of the copper potential in the upper carbonate subunit of the Helikian/Hadrynian Little Dal Group (Jefferson, 1978). Extensive deposits have been found in the Redstone Copper Belt (12, Fig. I-1), but none appear to be economic under present or forseeable conditions.

Similar-sized expenditures have been made between 1973 and 1978 looking for lead-zinc deposits in Helikian and lower Paleozoic carbonates. None of the finds made to date are large enough to be mined, and most appear to be small, structurally controlled, high-grade deposits probably produced by remobilization of low grade sedimentary lead and zinc. Most contain yellowish to reddish low iron sphalerite. The Gayna River discoveries (13, Fig. I-1) of Rio Tinto Ltd. appear to have the most potential for large tonnage, but these deposits are more properly described as Mississippi Valley type. With the weakness in base metal prices, particularly zinc prices, and the limited successes; activity has declined from a high in 1975-76 when at least 40 properties were extensively explored and a number of regional surveys undertaken, to a new low in 1978 when only 15 properties were worked.

A surge of exploration followed the aburpt increase in the gold price in 1973, but this was relatively minor compared to the amount of base metal exploration. Extensive work, including underground development, was done on O'Brien's Cullaton Lake deposit in the Churchill Province; and the Camlaren, WT Bullmoose and Salmita in the Slave Province where as well five gold properties were drilled in 1973, eight more were drilled in 1974 and one was drilled in 1975.

Rapid inflation and fluctuations in the price of gold have kept exploration at a low level since 1974, but there are signs that an increase which began during 1977 with drilling on the Crestaurum, Lynx Yellowknife and YT properties will continue to develop, spurred by higher gold prices and a devalued Canadian dollar.

MINERAL EXPLORATION SUMMARY

Mineral exploration in the Northwest Territories reached a new high in 1978. Continued decline in the base-metal sector was more than offset by the rapid growth of uranium exploration.

During 1978 at least 60 companies and 30 prospectors were working in the territory on at least 175 different projects. Seventy-five prospecting permits covering more than one million hectares were staked (Tables I-1 and I-2).

Table I-1 CLAIMS RECORDED IN N.W.T. BY YEAR - 1962 TO 1978

	MACKENZIE		ARCTIC AND HUDSON BAY		NAHANNI		TOTALS FOR N.W.T.		
YEAR	No. of claims	Area 10^3 ha	No. of claims	Area 10^3 ha	No. of claims	Area 10^3 ha	Claims Recorded	Area 10^3 ha	Work Recorded 10^3 $
1962	3,410	71.3	196	4.1	316	6.6	3.922	82.0	395
1963	2,934	61.4	361	7.5	212	4.4	3,507	73.3	1,012
1964	5,078	106.2	287	6.0	353	7.4	5,718	119.7	1,065
1965	13,438	281.0	501	10.5	48	1.0	13,987	292.5	1,022
1966	19,321	404.0	532	11.1	347	7.3	20,200	422.4	2,813
1967	26,277	549.5	1,290	27.0	1,055	22.1	28,622	598.5	2,511
1968	43,444	908.5	526	11.0	519	10.9	44,489	930.3	4,811
1969	10,589	221.4	8,031	176.9	463	9.7	19,083	399.0	4,262
1970	8,852	185.1	5,213	109.0	509	10.6	14,574	304.7	3,990
1971	5,188	108.5	1,371	28.7	146	3.1	6,705	140.2	2,781
1972	2,940	61.5	2,022	42.3	593	12.4	5,555	116.2	2,237
1973	7,158	149.7	4,836	101.1	3,309	69.2	15,303	320.0	2,337
1974	10,026	209.7	1,218	25.5	936	19.6	12,180	254.7	3,192
1975	10,370	216.8	5,315	111.1	5,364	112.2	21,049	440.2	5,030
1976	11,471	239.9	7,917	165.6	350	7.3	19,738	412.7	11,969
1977	15,081	315.4	6,682	139.7	827	17.3	22,590	472.4	4,976
1978	919	727.5	796	693.7	37	19.0	1,752	1,439.8	7,376

Total Claims in Good Standing, 1977: 2,863,113 ha

A change in the Canada Mining Regulations came into effect in November, 1977. Block staking in units of 50 old claims (an old claim measures 1,5000 x 1,500 feet) is now permitted. In 1978 the number of claims staked dropped by 75% from the previous year to 1,752 claims (Table I-1), but the ground covered increased by 330% to 1.5 million hectares as staking became simpler and cheaper. This is 0.5 million hectares more than was staked during the Coppermine rush of 1968.

Other changes in the Regulations permit assessment work for the first two years to be done and recorded any time during the first two years. This explains much of the rapid fluctuation in dollar value of work done in the period 1976, 1977 and 1978 (Table I-1).

Exploration expenditures have climbed steadily from a low of 7 million dollars in 1972 to approximately 50 million in 1978. The search for uranium, which has absorbed approximately 75% of the exploration dollars, is concentrated on two large areas. One is the 100-mile arc of Churchill Province rocks stretching about the Thelon Game Sanctuary from the Back River past Baker and Dubawnt Lakes to the Thelon River in the west. During the past five years (Table I-2) exploration has been concentrated along the edge of the Paleohelikian Dubawnt sandstone, which is analogous to the Athabasca Formation in Saskatchewan. Showings found to date are in two, east-northeast-trending belts of Aphebian quartzose sediments. They are stratabound, locally intensely faulted and of medium to low grade. At least three uranium deposits have been identified in the district south and west of Baker Lake, but as yet none have been shown to be economic. They are either too small or insufficiently explored.

The second area of major effort is in the Dismal Lakes region of the Hornby Basin, part of the Bear Structural Province, roughly an age equivalent of the Churchill Province. At Mountain Lake the main targets are stratabound uranium in Helikian sandstones and uranium deposited along or near the Aphebian-Helikian unconformity. At least one significant but not presently mineable deposit has been found.

Exploration in these two regions for uranium is reflected in the large number of permits issued and the large areas of ground staked in the Churchill and Bear Structural Provinces (Table I-3 A & B).

In addition to 18 exploration projects in the Hornby Basin, there are at least 18 projects farther south in the western part of the Bear Province where a number of small uranium and uranium-copper or uranium-silver deposits have been drill tested in the last few years. Uranium is also a target in the Goulburn and East Arm rocks, extremities of the Bear Province lying respectively on the northeast and southeast sides of the Archean Slave Province. Small, sandstone-hosted uranium deposits have been drilled in the East Arm, and the search for larger potentially economic deposits here, and in the Goulburn rocks of the Kilohigok Basin, continues.

Uranium exploration is underway also in other parts of the Churchill Province: on Baffin Island, and south of the East Arm in the Nonacho sandstones and Tazin metasediments where rocks similar in age and lithology to those in the Baker Lake area have been sporadically worked since the Uranium City boom in the early 1950's.

Base metal exploration has declined everywhere in the N.W.T. except around the Nanisivik mine on northern Baffin Island, and in the Pine Point

District where recent successes by Western Mines Limited have led to deep tests and widspread staking west of the extensive Pine Point Mines property. The staked belt is now nearly 100 miles long. It stretches from just east of Little Buffalo River almost to Kakiska Lake.

Table I-2 PROSPECTING PERMITS 1961 TO 1978

Number of Permits				Area of Permits (1,000 ha)		Permit Expenditure ($1,000)
Year	New	Lapsed	Total Held	New	Total Held	
1961	28	3	25	1,829	1,829	452
1962	8	14	19	554	1,218	465
1963	2	2	19	219	1,023	670
1964	Nil	10	18	628	1,033	474
1965	1	12	7	71	402	238
1966	8	2	13	625	829	330
1967	Nil	10	3		174	84
1968	17	Nil	20	1,083	1,206	666
1969	103	11	112	7,293	1,213	2,998
1970	54	39	127	3,458	1,260	3,114
1971	41	54	114	2,085	707	1,747
1972	17	66	65	702	375	926
1973	19	35	49	1,355	695	1,171
1974	39	21	67	3,085	1,199	2,963
1975	18	19	66	1,254	1,152	2,846
1976	68	22	112	4,786	5,850	3,531
1977	34	42	105	2,556	4,980	1,400
1978	75	37	143	1,033	2,875	2,160
Total 1978	544	399	143	32,618		26,235

Volcanic belts in the Archean Slave Province are still attracting attention, but much less than in the boom following the Hackett River and Izok Lake discoveries. In the Cordillera exploration continues for lead-zinc in the Besa and Road River shales of the Selwyn Basin, only the east edge of which is in the N.W.T., and for Mississippi Valley type deposits on the Gayna River area. Tungsten in skarns associated with quartz monzonite stocks intruded near the hinge between the Selwyn Basin and the platform carbonates to the east has become an important target with the rise in the price of that metal.

Gold exploration has increased considerably around Yellowknife where the Giant and Con Mines, who mill respectively 1,200 and 650 tons per day, seek to maintain their ore reserves. Elsewhere in the Slave Province there are innumerable small, high-grade, greywacke-hosted gold-quartz veins, some of which may be economic with gold prices above $500/ ounce. Gold associated with albitic dykes, iron formation, or quartz-carbonate shear zones is present in a number of places in the Slave Province, but little interest has been shown in these occurrences in the last few years.

Silver is produced from three high-grade, vein-type deposits on the east shores of Great Bear. The favourable andesitic volcanic piles in both these silver districts continue to attract intensive exploration for silver, uranium and base metals.

Shifts in exploration in the last few years are shown in Table 1-3. The significant increase in prospecting permits issued and area staked in the Bear and Churchill provinces reflects the shift to uranium exploration that began in 1975.

Table I-3 COMPARISON OF CLAIMS STAKED AND PROSPECTING PERMITS ISSUED IN 1975 TO 1978

A. PROSPECTING PERMITS

GEOLOGICAL REGION	1975	1976	1977	1978
Arctic Islands (Non PC)	0	0	0	10
Cordilleran Province	3	1	0	5
Churchill Province	12	53	25	50
Bear Province	2	13	8	10
Slave Province	1	1	1	0
Totals	18	68	34	75

B. GROUND STAKED DURING THE YEARS 1975 TO 1978 IN VARIOUS GEOLOGICAL 'PROVINCES' IN HECTARES

	1975	1976	1977	1978
Arctic Islands (Non PC)	10,539	Nil	Nil	-
Baffin Island (Churchill Province)	439	860	1,380	82,148
Keewatin Region (Churchill Province)	89,411	214,000	108,000	602,171
Churchill Province (West of Keewatin)	8,406	30,400	78,700	322,506
Slave Province	112,329	62,200	67,800	36,711
East Arm Subprovince	5,980	1,460	2,130	3,376
Bear Province	24,047	45,000	170,000	59,667
Pine Point District (Interior Plains)	47,696	49,200	5,620	255,269
Cordilleran Province	10,643	8,200	19,900	18,948
Total	309,490	411,320	453,530	1,430,796

DIAMOND DRILLING

Changes to the 'Canada Mining Regulations' which govern exploration in the N.W.T. make it necessary to report monthly all diamond drilling. As a result we now have a much better measure of total footage drilled.

Table I-4, below, gives the drilling reported in 1978. More than 2,100 holes were reported drilled, representing a quarter of a million meters.

Table I-4 DRILLING IN THE N.W.T.

	Metres
By District	
Franklin (Arctic Islands)	6,012
Keewatin	18,870
Mackenzie	92,220
By Geological Province	
Slave	26,472
Bear	25,514
Churchill	18,870
Cordillera	11,629
Interior Platforms	33,655
By Commodity	
Uranium	29,610
Base Metals	50,784
Precious Metals	33,984
Tungsten and Rare Metals	2,719
Total Drilling	227,179
Surface	117,102
Underground	110,007

Drilling in the Bear Province and Keewatin Region (Churchill Province), 25.5 and 18.9 thousand meters respectively, reflect the high level of uranium exploration in the Dismal Lakes and Baker Lakes Districts. Drilling in the Slave Province and Pine Point Districts (Interior Platforms), 36 & 38 thousand meters, include diamond drilling at the Yellowknife and Pine Point Mines, a major portion of the total.

Exploration drilling costs 30 to 300 dollars per meter. Mine drilling probably costs 30 to 60 dollars a meter. Approximately eleven million dollars was spent on drilling in 1978.

DIAND GEOLOGY SECTION ACTIVITIES

The Yellowknife Geology Office of the Northern Affairs Program of DIAND had a permanent staff of 10 in 1978. Four District Geologists monitored exploration in four regions of the N.W.T. (Figure I-2). James B. Seaton was responsible for the Bear and Slave Structural Provinces. Pierre J. Laporte worked in the Keewatin Region, which included the District of Keewatin, the southern half of the Melville Peninsula, and that small part of the District of Mackenzie lying south of the Thelon Game Preserve and east of the 104^{o} west longitude. Chris Lord was responsible for the Nahanni Region, which includes the Nahanni Mining District and covers that part of the District of Mackenzie west of the 123^{o} of longitude. Walter A. Gibbins, Arctic Region District Geologist, monitored the District of Franklin and that part of the Mackenzie District that lies between 104^{o} and 123^{o} west and is south of the Bear Slave Province. (Fig. I-2).

Staff Geologist John A. Goodwin monitored mining operations at the territories' eight producing mines (Chapter II of this report), prepared the section's input into the Geoscience Data System which contains computerizated descriptions of nearly all geological papers (including assessment work submissions) published on the N.W.T., and assists in administering the office.

Support staff includes Mae Sigvaldason, Office Manager, an Archivist who looks after the library of technical data and the assessment work files, and a clerk typist.

Geological field work done under the sponsorship or assisted by the Yellowknife Geology Office included: Detailed mapping of portions of the northern end of the Yellowknife Volcanic Belt (EGS-1979-10) and 1:50,000 scale mapping in the Itchen Lake area (EGS-1979-2) conducted under the supervision of A.F.S. Bau, Project Geologist.

Projects assisted through contracts or other forms of field support included 1:50,000 scale and more detailed mapping in (1) the Camsell River and Great Bear Silver Districts (EGS 1979-3); (2) the Dismal Lakes Hornby Bay area (EGS 1980-2); (3) the Courageous-Mackay Lake Volcanic Belt (EGS 1979-7). In addition, field work was underway in the Nonacho Basin, Yellowknife Volcanic Belt, and in the metasediments of the Slave Province. A mineral deposits study of the BX Group covering a mineralized diatreme near Taltheilei Narrows in the East Arm of Great Slave Lake was conducted by D. Blackadar for a M.Sc. thesis at the University of Alberta and a study of the Walsh Formation for a B.Sc. thesis at Ottawa University was done by J. Pell. L. Aspler studied the surficial geology and permafrost of the city of Yellowknife (EGS 1978-8), and began stratagraphic and structural studies in the Nonacho basin.

Lead isotope studies of Pb-Zn deposits in the Mackenzie Mountains were carried out by A.J. Sinclair and Colin Godwin at University of British Columbia. The results are presented as chapter 11 MIR-77, EGS 79-1.

A paleontological, paleobotanical and stratigraphical study of the Imperial Formation in the Mackenzie Mountains northwest of Norman Wells by L.J. Hills, University of Calgary, was assisted. A study of 6 diatremes in the Mackenzie Mountains was undertaken by A. Oldershaw and A. Nichols, also of the University of Calgary. The results of this study are presented as chapter 10 of MIR-77, EGS 79-1.

G. Yeo conducted a stratigraphic and paleoenvironmental study in the Hornby Basin of the Bear Structural Province. (chapter 9 MIR-1977, EGS 79-1). W.K. Fyson of Ottawa University was assisted in a structural study of the Yellowknife Supergroup and R.S. Lambert of the University of Alberta began a study of parts of the Yellowknife volcanic belt.

The Geology Section provided an expediting service for University and Geological Survey of Canada crews working from Yellowknife.

The results for most of the non-Gelogical Survey of Canada field research assisted by the Geology Section is available in open file and Mineral Industry Reports published in Yellowknife by IAND which are listed at the end of this section.

SERVICES AVAILABLE FROM THE GEOLOGY SECTION

The Northwest Territories Geology Section of IAND operates from Yellowknife where the following services are maintained for those interested in the geology and non-renewable resources of the N.W.T.

An Archive and Geological Library contains most federal government documents on the geology of the NWT and many government publications on the mineral industry of the N.W.T. and Canada. A small library of N.W.T. aerial photography is available. A 16 mm cassette system of air photo negatives providing coverage for all of the N.W.T. is also available in the Regional Natural-Resources Technical-Library. The Library also maintains a broad spectrum of current journals and texts on geology, mineral deposits and mineral exploration. A small but steadily expanding library of theses on the geology of the N.W.T. is also maintained for the Geology Section by the Regional Library.

Assessment work reports for most of the mineral exploration work done in the Territory is available in both the original format and on microfiche. Oil and gas exploration reports are available on microfiche.

Regular reviews of periodicals on N.W.T. mining properties have been done for many years by the Geology Section. Articles of interest have been preserved and filed with the assessment reports to develop a valuable data base on many N.W.T. Mining

Properties. An Archive of journal articles on geology relevant to the N.W.T. is now under development.

A facility is maintained for the storage, examination and processing of drill cores and rock samples. This includes a well-equipped assay laboratory.

Advice to the general public, rock and mineral collectors, prospectors and the mineral industry is available from a staff of 15 (as of 1981), which includes 7 professional geologists, a Core Library Manager, an assayer and 6 support staff with many years experience serving the exploration industry.

Claim maps and property ownership maps are available for inspection or purchase from the IAND Drafting Section, through the Mining Recorders' offices.

The Geology Section in Yellowknife is a depository for Geological Survey of Canada Releases on the geology, mineral deposits and the mineral industry of the N.W.T.

FORMAT AND ACKNOWLEDGEMENTS

There are sixteen chapters in this report. The author of each section is given on the first page and in the table of contents. Reference to this report should be made to the author of the individual section of interest as in: Laporte, P.J., Mineral Industry Report, Northwest Territories, Chaptér IV, The Keewatin Region. EGS 1981.

Preliminary editing was the responsibility of J.A. Goodwin. W.A. Padgham edited and compiled the Report for printing. Most of the drafting is by Denis Valiquette and Robert Toth of the IAND Drafting Section, Yellowknife.

The minor variations in organization from region to region apparent in this report have been allowed in order to facilitate production of a report that would best fulfill the needs of the region as recognized by the District Geologists involved.

The title or introductory section gives the name of the group, company or persons doing the work. If this is not the claim owner, that may be noted in *HISTORY* or in some cases, where the change was made in 1978, in *CURRENT WORK*. Essentially the report deals with properties under the name of the persons or company that did or contracted for the work.

LOCATION, when convenient, is given by National Topographical sheet (NTS) number, by latitude and longitude and under location by reference to local topography and distance from a major centre. As most names in use have not been approved by the Canadian Permanent Committee on Geographical Names we have not attempted to differentiate these in any way.

REFERENCES are given to the most current regional and detailed published geological maps and reports. Properties have been grouped in districts where locations, histories, references and geological situation are similar.

HISTORY describes the past work on the claim, or earlier staking of the ground where this is known. The *DESCRIPTION* gives the local and, in some cases, regional geology and the economic geology of showings or deposits if known from non-confidential sources.

CURRENT WORK AND RESULTS deals with 1978 work on various claims and permits, but in some cases regional reconnaissance has not been directly connected with mining properties, so no property can be listed. Because in many cases current work has been verified by reference to assessment work records which may not be open to public scrutiny until late 1981, or in some cases 1982, all write-ups have been submitted to the companies who did the work to ensure disclosures of confidential data do not occur.

The kindness and assistance of exploration crews and the geologists in charge of these crews, have enabled the District Geologists to more effectively monitor the mineral exploration of their Regions, and are gratefully acknowledged.

Company personnel who have reviewed our property and activity descriptions have significantly contributed to the improvement of this report. Dr. Walter A Gibbins thanks the Polar Continental Shelf Project for assistance with transportation and logistics in the Arctic Islands portion of his Region.

Reference to individual reports by industry exploration personnel is not made in this publication. Such reports are available only from the claim 'owners' or from the IAND Archive. We are indebted to industry geologists whose work has been used directly or indirectly in preparing property descriptions.

All industry reports filed with the Geology Division are listed in the 'Index to Mining Assessment Reports' published by IAND from time to time.

We also thank numerous contractors, mainly University Professors and students, and aircraft operators for their cooperation. Officers of the Geological Survey of Canada working in the N.W.T. have been most helpful with their time and expertise which is much appreciated.

LIST OF PUBLICATIONS ON THE N.W.T AS OF SEPTEMBER, 1981 BY YELLOWKNIFE GEOLOGY SECTION D.I.A.N.D.

MINERAL INDUSTRY REPORTS

Mineral Industry Report, 1969-70, Vol. 2, Northwest Territories, east of 104° longitude; by P.J. Laporte, 1974. $2.00

Mineral Industry Report, 1971-72, Vol. 2 Northwest Territories, east of 104° west longitude; by P.J. Laporte, 1974. $2.00

EGS 1975-8 Mineral Industry Report, 1971-72, Vol. 3, Northwest Territories west of 104° longitude; by W.A. Padgham, M.M. Kennedy, C.W. Jefferson, D.R. Hughes and J.D. Murphy. $3.00

EGS 1976-9 Mineral Industry Report, 1973, Northwest Territories; by W.A. Padgham. J.B. Seaton, P.J. Laporte and J.D. Murphy. $3.75

EGS 1977-5 Mineral Industry Report, 1974, by W.A. Gibbins, J.B. Seaton, P.J. Laporte, J.D. Murphy, E.J. Hurdle, W.A. Padgham. $4.50

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Papers

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OPERATING MINES

J.A. Goodwin, Staff Geologist,
D.I.A.N.D. Geology Office, Yellowknife

INTRODUCTION

In 1978 nine mines: the Con, Giant, Pine Point, Terra, Echo Bay, Norex, Nanisivik, Northrim and Cantung, operated in the Northwest Territories (Figure I-1). The Norex mine was operated periodically by Terra Mines Ltd. and Northrim was closed in July. Strike Lake resources continued small-scale gold mining on the JOON claim near the old Beaulieu Mine. Production was reportedly about 100 ounces Au.

Giant, Con, Echo Bay, Terra, Northrim and Norex produce mainly precious metals from shear zone and vein deposits in Precambrian volcanic rocks of the Slave and Bear Provinces. Cantung Mine extracts tungsten and copper from skarns developed in Cambrian carbonates during the intrusion of a Cretaceous quartz monzonite. Pine Point and Nanisivik mines produce lead and zinc concentrates from stratabound orebodies in Paleozoic and Proterozoic carbonates respectively.

Production data for 1978 are summarized in Table II-1 below, and 1978 year-end reserves are given in Table II-2.

Total value of metallic mineral production in the N.W.T. during 1978 was $316.5 m, or 4.5% of the value of Canadian Metal production. The N.W.T. contributes the following percentages of Canadian production: 100% WO_3, 22.7% Pb, 18.8% Zn, 11.9% Au and 10.1% Ag.

Fourteen point seven per cent of the N.W.T. work force is engaged in mining, compared with 0.6-3.5% in the Provinces, and the per capita value of mineral production is $7,623, nearly 10 times the Canadian average of $837.

TABLE II-1: PRODUCTION FIGURES FOR OPERATING MINES IN THE NORTHWEST TERRITORIES, 1978

COMPANY	PINE POINT MINES LTD.	CANADA TUNGSTEN MINING CORP.	ECHO BAY MINES LIMITED	TERRA MINING & EXPLORATION CO.	NOREX RESOURCES	NANISIVIK MINES LIMITED	GIANT YK MINES LTD.	CON MINE (COMINCO)
TYPE OF OPERATION	Open pit & underground	Underground	Underground	Underground	Underground	Underground	Underground & open pit	Underground
LOCATION	Pine Point	Tungsten	Great Bear Lake	Rainy Lake	Rainy Lake	Strathcona Sound	Yellowknife	Yellowknife
RATE, TONS PER DAY	9,014	535	104	N/A		1,803	1,087	700
GRADE	2.6% Pb 5.9% Zn	1.96% WO_3	61.69 oz/ton Ag* 0.7% Cu*	22.8 oz/ton Ag 0.07% Cu*	98.4 oz/ton Ag 0.28% Cu 1.08% Pb	1.44% Pb 13.24% Zn	0.271 oz/ton Au	0.55 oz/ton Au
TOTAL TONS MILLED	3,290,000	194,740	37,278	29,070	7,837	574,326	397,000	219,981
PRODUCTION	163.70 m.lbs.Pb 357.07 m.lbs.Zn	6,361,700 lbs. WO_3	2,299,798 oz Ag 524,399 lb Cu	663,697 oz Ag 46,406 lbs Cu	770,946 oz Ag 44,611 lb Cu 170,543 lb Pb	11,514 tonnes Pb conc. 128,486 tonnes Zn conc.	95,413 oz Au 24,778 oz Ag	114,482 oz Au 30,503 oz Ag
EMPLOYEES	572	181	119	53	N/A	169	340	272

* Estimated

TABLE II-2: ORE RESERVES, 1978

RESERVES (YEAR END) 1000 TONS	PINE POINT MINES LTD.	CANADA TUNGSTEN MINING CORP.	TERRA MINING & EXPLORATION	ECHO BAY MINES LTD.	NOREX RESOURCES	NANISIVIK MINES LTD.	GIANT YK MINES LTD.	CON MINE (COMINCO)
1978	37,300	4,200	N/A	33.5*	N/A	5,288	1,216	1,600
1977	37,500	4,200	18.2	N/A	6.67	6,353	1,001	1,630
1976	36,200	4,190	N/A	N/A	N/A	6,324	1,505	1,470
1975	39,200	4,437	12.5	N/A	N/A	6,970	1,950	1,670
RESERVE GRADE (YEAR END)								
1978	1.9% Pb 5.1% Zn	1.55% WO_3	N/A	55 oz/ton Ag*	N/A	11.54% Zn 1.23% Pb	0.27 oz/ton Au	0.57 oz/ton Au
1977		1.55% WO_3	37 oz/ton Ag	N/A	41 oz/ton Ag	13.4% Zn 1.45% Pb 60 g/tonne Ag	0.34 oz/ton Au	0.59 oz/ton Au
1976	2.0% Pb 5.4% Zn	1.55% WO_3	N/A	N/A	N/A	14.12% Zn 1.4% Pb 1.8 oz/ton Ag	0.34 oz/ton Au	0.53 oz/ton Au
1975	2.0% Pb 5.4%Zn	1.60% WO_3	62 oz/ton Ag	N/A	N/A		0.33 oz/ton Au	0.58 oz/ton Au

* Estimated

TABLE II-3: TABLE OF FORMATIONS NANISIVIK MINE AREA
(From Jackson and others 1978)

	FORMATION		LITHOLOGY
Hadrynian	Franklin Intrusions		Diabase
	Intrusive Contact		
Neohelikian	Elwin about 4000 ft (1220 m)		Subarkose, quartz arenite, siltstone
	Gradational		
	Strathcona Sound more than 3000 ft (910 m)		Arkose facies, greywacke facies, grey siltstone facies, red siltstone facies, carbonate facies
	Gradational to Unconformable		
	Victor Bay 2000 ft (610 m)		VB_2 Flat pebble conglomerate, shale VB_1 Shale, siltstone, dolostone
	Gradational? to Unconformable		
	Society Cliffs 2000 ft (610 m)		Stromatolitic dolostones
	Gradational to Unconformable		
	Arctic Bay 1700 ft (520 m)	Fabricius Fiord 5400 ft (1650 m)	AB_5 Stromatolitic dolostone, shale AB_4 Shale, siltstone, dolosiltite AB_3 Shale, siltstone AB_2 Shale, siltstone, dolostone AB_1 Siltstone, shale, quartz arenite FF_3 Siltstone, quartz arenite, quartz-pebble conglomerate FF_2 Shale, siltstone, quartz arenite FF_1 Quartz arenite, shale
	Gradational		
	Adams Sound 2000 ft (610 m)		AS_3 Quartz arenite, minor conglomerate AS_2 Quartz arenite AS_1 Quartz arenite, minor conglomerate, shale
	Conformable		
	Nauyat 1400 ft (430 m)		N_2 Basalt flows N_1 Subarkose, quartz arenite, minor basalt
	Nonconformity		
Archean-Aphebian	Granitic gneiss basement		

NANISIVIK MINE
Nanisivik Mines Ltd.,
610,355-4th Av. S.W.
Calgary, Alberta.
T2P 0J1

Lead, Zinc
48 C/1
73°02'N,84°30'W

REFERENCES

Blackadar (1956, 1970); Blackadar and others (1968d); Clayton (1966); Geldsetzer (1973a, 1973b); Jackson and others (1978); Lemmon and Blackadar (1963); Olsen (1977); Trettin (1969).

PROPERTY

Mining Leases 2274-5, 2281, 2451-3, 2799, 2801-4, 2875-7, 2905.

Claims: Gull 1-3, 6-17, 22-28, 30-35, Whale 1-25.

LOCATION

The property is on the south shore of Strathcona Sound, a fiord on the north end of Baffin Island. The deposit is immediately west of Kuhulu Lake and 27 km east of the settlement of Arctic Bay.

HISTORY

A. English, a prospector with the Dominion Government Expedition (1910-1911) to the Arctic Islands, discovered pyrite with minor sphalerite and galena on the south side of Strathcona Sound. In 1937 prospectors J.F. Tibbet and F. McInnes staked two claims on a pyrite showing near the western end of the Strathcona Sound, but their claims lapsed the following year.

The area was mapped and some of the pyrite showings were visited in 1954 (Blackadar, 1965). Geologists from Texas Gulf Sulfur staked several claims in 1957. Detailed geological and geophysical surveys and trenching tested the showings in 1958. Between 1961 and 1965, over 25,908 m of drilling outlined the ore body and tested several other showings. Geological surveys and 610 line m of geophysical surveys were done between 1966 and 1967. In 1969 an adit and four cross-cuts explored the east end of the main orebody, and in 1970 a 50-ton sample was taken for metallurgical testing.

In 1972 Mineral Resources International Ltd. agreed to bring the Strathcona Sound deposit to

production and acquire thereby a 65% interest in the property. The firm of Watts, Griffis and McOuat was engaged to prepare a feasibility study. The west end of the deposit was drilled and bulk sampled, and the GULL claims were staked in late 1972. A feasibility study and additional geological, geophysical and geochemical surveys were completed and heavy equipment was delivered by sealift in 1973. A new company, Nanisivik Mines Ltd., formed in 1974 to operate the mine, is owned 59.5% by Mineral Resources International, 18% by the Government of Canada, 11.25% by Metallgesellschaft Canada Ltd. and 11.25% by Biliton B.V. In 1974, Strathcona Mineral Services Limited was contracted to manage the project.

Between August, 1974 and March, 1975, two adits and a connecting ramp were excavated at the western end of the ore body. The upper adit follows the top of the ore zone; the lower adit is the main service drift to the crushing, screening and storage facilities.

By the end of September, 1976, Nanisivik Mines had constructed a concentrator, central power plant and underground crushing plant. Production began on September 30, 1976 at 1,421 tonnes per day.

DESCRIPTION

The regional geology of the Strathcona Sound-Arctic Bay area has been discussed in several maps and is shown on Map 1237A (Blackadar and others, 1968b).

The stratigraphy and lithology of the area are given in Table II-3. Preservation and present distribution of Proterozoic rocks is controlled by a northwesterly-trending, 25-km wide graben that extends across Borden Peninsula. Within this system the Proterozoic sediments have been downdropped, folded and

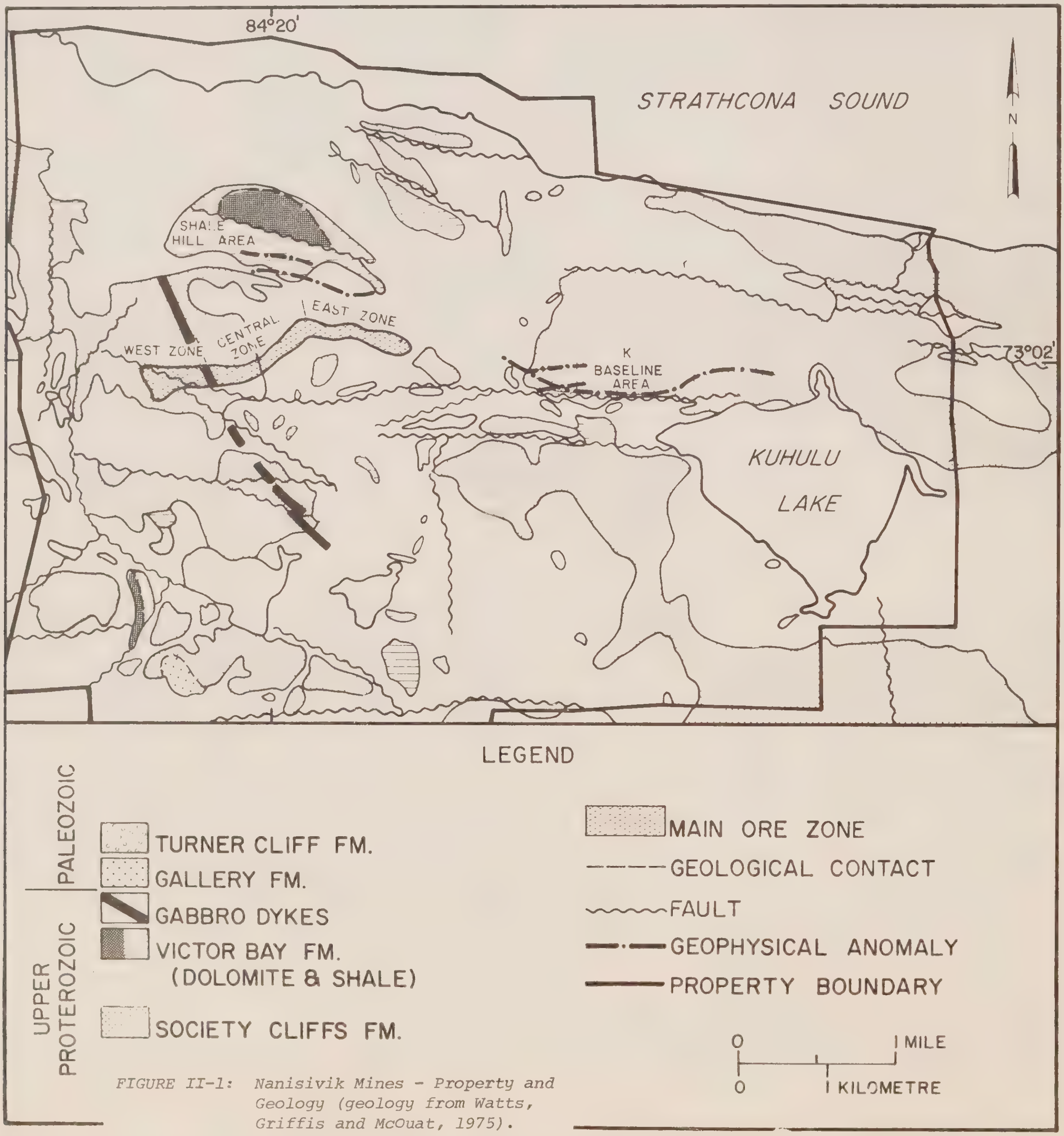


FIGURE II-1: Nanisivik Mines - Property and Geology (geology from Watts, Griffis and McOuat, 1975).

faulted into a series of smaller horsts and grabens and intruded by distinctive gabbro dyke swarm. The sediments strike across the graben system.

Society Cliffs dolomite, which underlies most of the Nanisivik property and much of the graben, contains the orebody (Fig. II-1). In the vicinity of the deposit, this formation is typically a medium to dark brown, laminated algal dolomite. Solution breccia, flat pebble conglomerate, vugs, petroliferous odor and stain, carbonaceous matter, and narrow veinlets of recrystallized carbonate are common.

Geldsetzer (1973a, 1973b) has shown that dolomitization, solution and collapse brecciation, karsting, mineralization and cementation of the breccias took place in a short time interval, between deposition of the Society Cliffs and Victor Bay Formations. Furthermore, uplift and erosion, depth and degree of karsting and brecciation of the Society Cliffs Formation increase in a westerly direction.

Olsen (1977) postulates that the ore-fluid, and contained metals, were derived from the Arctic Bay Formation, the sulphides being deposited when the ore-fluid entered hydrocarbon-filled caves.

The sulphide ore body is flat-lying, trends east for 3,048 m and has a sinuous shape similar to gentle river meanders. In cross-section (Fig. II-2) it is a horizontal lens 61 to 122 m wide and up to 18.29 m thick in the centre. Sphalerite and galena are the most important ore minerals and pyrite the major gangue mineral. Sphalerite is coarse grained and varies in colour from light buff to dark brown, mainly because the iron content varies from 0.25 to 11.5 weight per cent. Small but variable amounts of cadmium and silver, and minor amounts of dolomite, calcite, quartz, pyrrhotite and chalcopyrite are present in the ore zone. The cadmium and silver are associated with sphalerite. Much of the ore has roughly horizontal, 0.5-to 2-cm thick sphalerite layers alternating with sparry carbonate and pyrite layers. The sulphide ore body usually has a sharp and well-defined contact with the barren dolomite. Commonly an envelope of massive pyrite separates the lead-zinc ore from the dolomite. Sulphides are rarely found above the ore body, but deep drilling has intersected vertical keels of pyrite connecting the body with a lower, roughly parallel, horizontal sulphide lens.

Solution and collapse breccias seems to be less common in the immediate vicinity of the ore.

The Watts, Griffis and McQuat feasibility report concluded that the Strathcona Sound orebody contains 6,323,142 tonnes averaging 14.1% Zn, 1.4% Pb and 1.8 oz/ton Ag, based on a cutoff grade equivalent to 7% zinc (Mineral Resources International Annual Report, 1974).

CURRENT WORK AND RESULTS

Construction of mine facilities was completed. Due to a compressor fire, two weeks mill production was lost. Despite a poor shipping season, 126,800 tonnes of zinc concentrate and 11,900 tonnes of lead concentrate were shipped. During the year, 4140 meters were drilled underground.

Exploration on the property probed 3 main targets:

(1) Lower Sulphide Zone - 64 holes, (2,337 m) tested a lens of sulphides below the main orebody. Over an explored length of 800 m the lens was found to be similar in size and geometry to the Upper Sulphide lens, which is connected to it by a vertical keel.

Exploration to date suggests this part of the lower sulphide zone contains less than 300,000 tonnes of economic grade.

Four of the drill holes established the contact of the Society Cliffs dolomite with the underlying Arctic Bay Shales at 300 m below the mine workings north of the main fault.

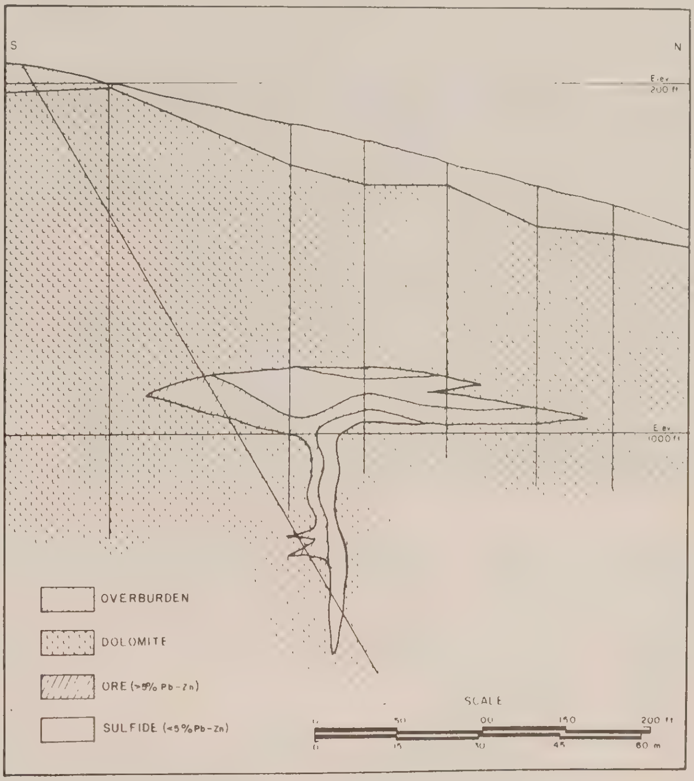


FIGURE II-2: Representative cross section of Nanisivik ore body. (From Watts, Griffis and McQuat, 1973).

(2) Shale Hill Area - fourteen drill holes (942.4 m) tested a geophysical anomaly, indicating about 125,000 tonnes of ore.

(3) K-Baseline - twelve drill holes (1,084.6 m) tested a geophysical anomaly, intersecting erratically distributed ore-grade mineralization.

Ore reserves as of January, 1979 were 5,287,800 tonnes grading 11.5% Zn and 1.23% Pb.

PRODUCTION DATA: NANISIVIK MINES

YEAR	TONNES MINED	GRADE Zn%	GRADE Pb%	Ag grams/ tonne	TONNES PRODUCED Zinc	TONNES PRODUCED Lead
1977	546,000	13.27	2.00	50.0	67,000	1,092
1978	574,000	13.24	1.44	61.7	66,417	9,564

leaching plant was started.

Production was from 8 pits, the A-70, N-38A, I-46, K-53, J-69, R-61, T-58 and X-15, with the X-15 accounting for 37% of the mill feed. The K-53 and I-46 pits began production this year and N-38A was mined out.

Three new deposits were discovered on the property. Two, near the Buffalo River, total about 1 m tons grading 2.30% Pb and 6.00% Zn, and will probably be mined as one pit.

Exploration, in the form of I.P. surveys and drilling of 33,521 m in 689 surface holes, was mainly concentrated on the North Trend.

PRODUCTION DATA: PINE POINT MINES

Year	Tons Milled Daily	Tons in year (millions)	Milled %Pb	Milled %Zn	Grade Million lbs. Pb	Production Million lbs. Zn
1976	10,340	3.773	1.7	5.3	121.25	377.94
1977	9,432	3.443	2.1	5.3	137.53	332.97
1978	9,014	3.290	2.6	5.9	163.70	357.07

CON MINE
P.O. Box 2000,
Cominco Limited,
Yellowknife, N.W.T., X1A 2M1

Gold, Silver
85 J/8
62°27'N, 114°22'W

REFERENCES

Baragar (1962); Baragar and Hornbrook (1963); Boyle (1961); Breakey (1975); Campbell (1947,1949); Henderson and Brown (1966); Henderson (1970, 1976); Jones (1977); Lauer (1957); Lord (1951); McGlynn (1971); Padgham, Kennedy and others (1975); Sproule (1952); Thorpe (1966, 1972).

PROPERTY

A. Wholly Con owned claims: CON 1-4; Kamex 13-14, 31,33-35; ROSE 1,2; STAR 1,2: SOL 1-4: PIZ 1,2: MIDNIGHT 1; NEGUS 1-6.
B. Rycon Mines Ltd. (76% Cominco owned); P & G 1-4.
C. Kamcon Mines Ltd. (74% Cominco owned); KAM 1-25.

LOCATION

The Con-Rycon property is 0.8 km south of Yellowknife, on the west side of Yellowknife Bay (Figs. I-1, II-6). The property lies mainly within the city limits.

HISTORY

The CON claims were staked in 1935. The Con shaft was collared in 1937 and a 100-ton per day mill was put into operation in 1938. The mill capacity was increased to 350 tons per day in 1942.

The P & G claims were staked in 1936 and Rycon Mines Ltd. was incorporated to explore and develop them. The Rycon shaft was collared in 1938. Crosscuts on the 500 and 950-foot levels were extended easterly from the Con shaft to connect with the Rycon workings. In 1939 the first Rycon ore was received at the Con mill.

The Negus Mine opened in 1939 with a 50 ton per day mill and was shut down in 1951. Its shafts are now part of the Con Mine ventilation system.

The Campbell system of ore-bearing shear zones was discovered in 1944 and was intersected by a crosscut from the Con Mine's 2,300-foot level in 1948, Production from the Campbell system began in 1956.

Until 1970 the mill treated refractory sulphide ore. That year it was converted to milling free gold. The 1,655 m Robertson shaft was collared in 1973 and completed in 1977 to facilitate production from the deeper levels. During 1977 the mill's capacity was increased from 450 to 650 tons per day.

The main surface exploration during the last few years has been on the KAMEX and Kamcon's KAM claims to the south of Con Mine. Continued drilling has attempted to delineate ore reserves in the southerly extension of the Campbell shear zone.

DESCRIPTION

The country rocks are Archean metabasalts and meta-andesites of the Kam Formation intruded by a swarm of westerly-dipping gabbroic dykes. Mineralized shear zones cut both the volcanics and gabbro dykes and are in turn cut by diabase dykes and younger faults (Fig. II-6). Two gold-bearing shear zones, the Con and the Campbell, have been developed in the Con Mine.

The Con shear zone, which has an average strike of 020° and dips west, varies from 3 to 75 m in width and has been traced on the surface for 8 km. The Campbell shear zone strikes 020°, dips 50° NW and lies about 1,100 m east of the Con system. It is considered by some to be the faulted extension of the Giant shear zone. The zone ranges from 60 m to more than 300 m in width, and has been traced for a strike length of 8 km.

Mineralization in the shear zones is in lenses and veins of white to dark grey quartz. In the deeper levels of the Campbell shear, six broadly parallel veins separated by varying thicknesses of chlorite schist have been recognized (Breakey, 1977). The ore bodies, commonly 2 to 6 m wide and 90 m long, are localized in dilation zones such as flexures in the shear systems, intersections of converging shears, and in the pressure shadows of undeformed volcanic 'horses' that were rotated during shearing (White and others, 1949; Bateman, 1951; Sproule, 1952). Some quartz lenses are enveloped in as much as 2 m of chlorite-carbonate-sericite alteration and where not vertically continuous, are frequently linked by alteration zones (Breakey, 1977).

The veins are mineralized with pyrite, arsenopyrite, stibnite, chalcopyrite, sphalerite, gold, silver, galena and a variety of sulphosalts and tellurides.

Zoning in the Campbell shear, recently described by Breakey (1977), consists of: vertical zonal distribution of arsenopyrite and sulphosalts; regular variation in the iron content of sphalerite; regular variation in the pyrite to pyrrhotite ratio; and zonal distribution of bismuth minerals.

CURRENT WORK AND RESULTS

Construction of a new dry and office at the Robertson shaft continued. Production, mainly from the Campbell Shear Zone, increased by 25% in 1978.

Exploration consisted of surface drilling on the Campbell shear zone to the south of the mine, and underground drifting and 80,076 m of drilling to

explore the Campbell shear adjacent to established ore zones.

Ore reserves are 1.6 million tons averaging 0.57 oz/ton Au.

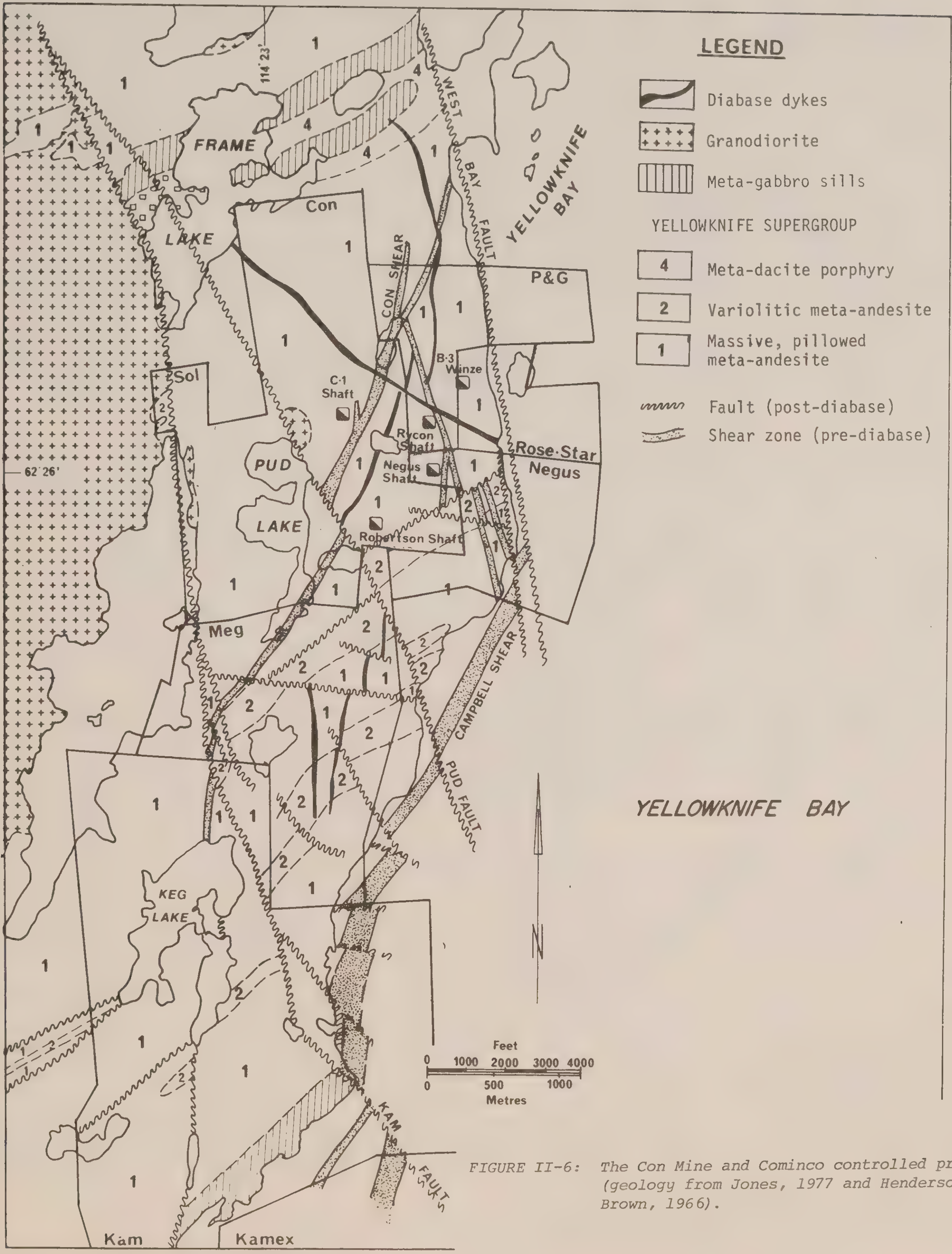


FIGURE II-6: The Con Mine and Cominco controlled properties (geology from Jones, 1977 and Henderson and Brown, 1966).

PRODUCTION DATA: CON MINE

Year	Tons Milled Daily	Tons Milled 1978	Grade Au oz.	Prod. Au oz.	Prod. Ag oz.
1976	413	151,000	0.62	90,300	
1977	430	157,295	0.62	92,858	
1978	700	219,981	0.55	114,487	30,503

GIANT MINE
Giant Yellowknife Mines Ltd.,
Yellowknife, N.W.T.

Gold, Silver
85 J/8, 9
62°30'N, 114°22'W

REFERENCES

Baragar (1961, 1962); Boyle (1961); Brown, Dadson and Wrigglesworth (1959); Dadson and Emery (1968); Gibbins and others (1977); Henderson and Brown (1966); Henderson (1970, 1976, 1978); Hodgson (1976); Kirkland (1947); Laporte and others (1978); McGlynn (1971); Thorpe (1966).

PROPERTIES

Wholly owned Giant claims. GIANT 1-21; Giant extension 1-5; LAW 2,3.

Lolor Mines Ltd. (87.5% Giant owned); LOLOR 3-5, 7.

Supercrest Mines Ltd. (50% Giant owned); AES 27-50; PA fr; FB fr.

Lynx option; GOLD 1-6; LYNX: FOX: JOYCE.

LOCATION

Giant Mine is 3.6 km north of Yellowknife, on the west side of Yellowknife Bay. Most of the property lies within the city limits. (Figs. I-1, II-7)

HISTORY

The GIANT claims were staked in 1935 and acquired in 1937 by Giant Yellowknife Mines Ltd. In 1944 drilling intersected gold-bearing shear zones and veins in the Baker Creek Valley. Production commenced in 1948 when a 500 ton per day mill was put into operation. The mill's capacity increased to 1,000 tons per day by 1960.

In 1936 the LOLOR claims were staked. In the 1950s' the 750-foot level of Giant Mine was extended into these claims and production began in October, 1967. In 1936 the AES or Akaitcho property was staked. In 1964 a drift from the 750-foot level of Giant Mine to the Akaitcho ore zone was started and production began in October, 1967.

In 1974 open pit development began near the south end of the GIANT property in a zone which, to a depth of 91 m contained about 500,000 tons of rock grading 0.3 oz/ton gold. Full-scale pit production started in 1975. In 1976 the pit was completed and stripping began on four new pits.

DESCRIPTION

The country rocks are northeast striking, steeply west-dipping, overturned Archean andesites, basalts and irregular gabbro dykes of the Kam Formation. Shear zones containing the Giant ore bodies cut both the volcanics and associated gabbros and are in turn cut by Proterozoic diabase dykes and faults (Fig. II-7).

The shear zones are subparallel, interlacing chlorite-sericite zones up to 762 m in length and 137 m in width. In places they enclose horses of unsheared greenstone. Irregular and lenticular ore bodies ranging from 1 to 15 m in width are localized in dilation areas such as shear zone junctions, flexures in the walls and drag-folded parts of the shear zones (Boyle, 1961).

The ore bodies contain about 7% metallic minerals, mainly pyrite, arsenopyrite, stibnite, sphalerite, sulphosalts and gold, within a quartz-chlorite-sericite gangue. Kirkland, (1947) has shown that the amounts of quartz and chlorite in the ore vary directly and inversely, respectively, with the gold content.

CURRENT WORK AND RESULTS

During 1978 Giant property produced 85,049 oz Au from 365,000 tons of ore averaging 0.263 oz/ton. Twenty-nine percent of mill feed were from the A1, A2 and B1 open pits.

The Lolar property produced 3,028 oz Au from 10,600 tons grading 0.323 oz/ton, and Supercrest produced 7,336 oz from 21,200 tons grading 0.391 oz/ton.

Ore reserves at year end were 1,216,000 tons averaging 0.27 oz/ton Au. Most new tonnage represents additions of low grade that has become ore as a result of a higher gold price. As well 135,000 tons at .18 oz/ton will be mined as the C1 open pit and 144,000 tons have been added by diamond drilling.

Exploration continued at depth and toward the north end of the property. Two holes drilled from the 2,000' level did not encounter gold values. Three holes were drilled from 575' level near the "A" shaft, to test a shear zone containing 60% quartz veining.

A drive to Supercrest from the 1,500' level was advanced 231 m and a drill program, begun in 1977, outlined a 4.5 m wide zone with "a potential for about 22,000 tons of ore". Surface drilling at Supercrest consisted of 22 holes totalling 3,005 m. Narrow ore-grade intersections were obtained over a strike length of 152 m and to a depth of about 150 m.

Eleven holes, totalling 783.8 m, were completed on the Lynx option. Ore values were intersected over narrow widths in three separate areas.

Total underground and surface drilling on the mine properties and Lynx option was in excess of 30,118 m.

PRODUCTION DATA: GIANT-LOLOR-SUPERCREST PROPERTY

Year	Tons Milled	Tons Milled Daily	Grade Au oz/ Ton	Grade Ag oz/ Ton	Production Au oz	Production Ag oz
1976	428,154	1,173	0.281	0.059	106,714	25,157
1977	446,192	1,222	0.271	0.051	106,143	22,809
1978	397,000	1,087	0.271	-	95,413	24,778

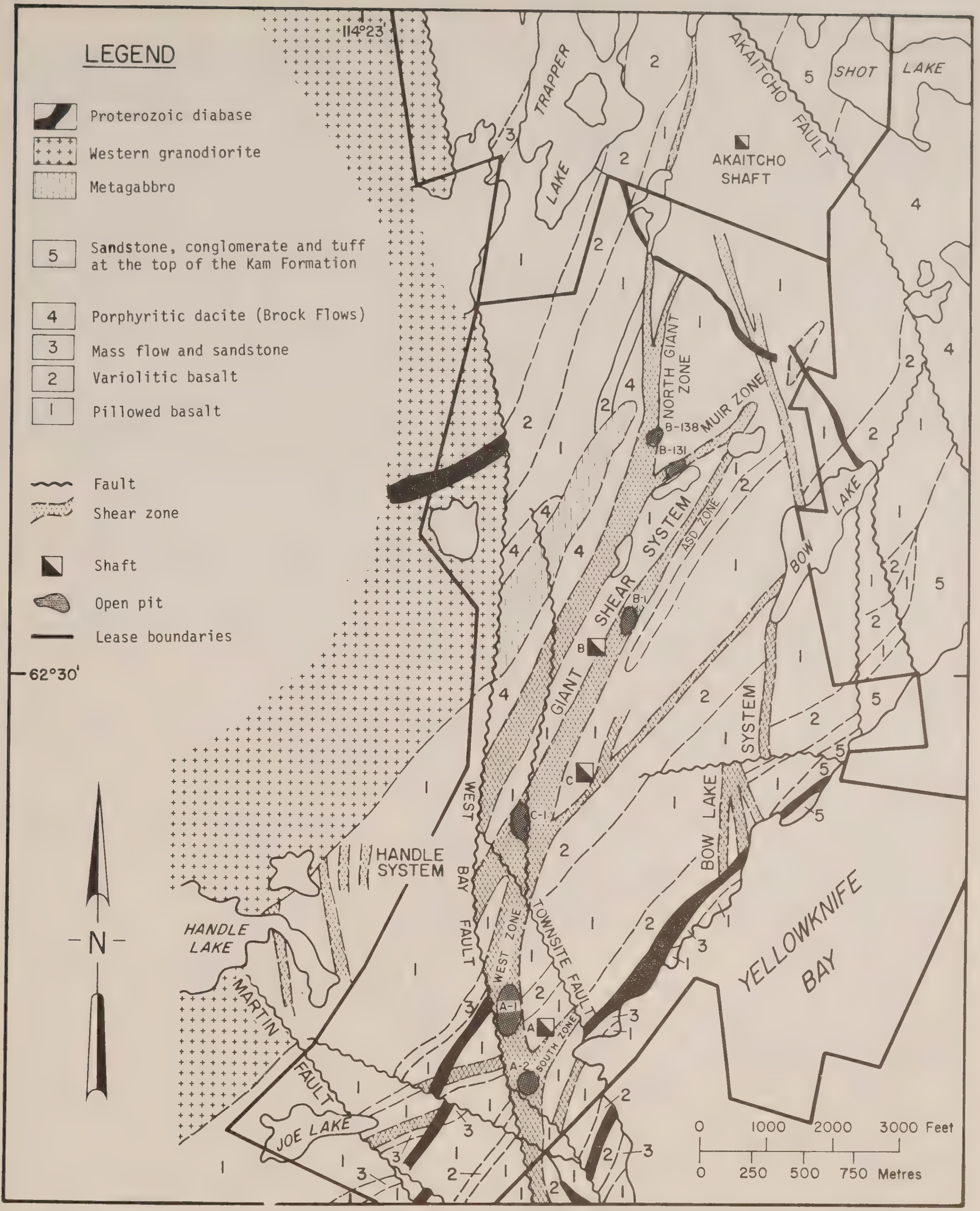


FIGURE II-7: Giant Mine, geology from Henderson and Brown, 1966.

TERRA MINE,
Terra Mining & Exploration Ltd.,
P.O. Box 5000,
Hay River, N.W.T.

Copper, Silver, Bismuth
86 E/9
65°36'N, 118°07'W

REFERENCES

Badham (1975); Gibbins and others (1977); Hildebrand (1978); Laporte and others (1978); Murphy and Shegelski (1972); Shegelski (1973); Shegelski and Thorpe (1972); Thorpe (1972).

PROPERTY

A 1-24; ZAP 1-10

LOCATION

Terra Mine lies on the Camsell River about 8 km from its mouth and 405 km from Yellowknife (Fig. II-8). Access is by air to the Terra and Norex airstrips.

HISTORY

The property, first staked as the YAW group, was restaked in 1966 as the A group by Silver Bear Mines Limited a wholly owned subsidiary of Terra Mining and Exploration Ltd.

In 1967, 31 surface drill holes, totalling 2,820 m, intersected a mineralized zone that contained a 1.8 m section grading 93.8 oz/ton Ag and 1.96% Cu. In 1968, 22 underground holes, totalling 912 m, were drilled and 545 m of 17% grade inclined shaft was driven to reach a depth of 106 m.

In 1969 a mill was constructed and milling began at a rate of 150 tons per day in October.

By 1976 the haulageway decline had been extended past the 10th level and workings reached the 1,100 foot level.

DESCRIPTION

The country rocks are Aphebian felsic and andesitic volcanics, volcaniclastics, chert, argillite, sandstone and conglomerate, attributed to the Echo Bay Group (Shegelski, 1973) or the Labine Group (Hildebrand, 1978). (Fig. II-8). The supracrustals are intruded by syenitic laccoliths and younger granitic rocks of the Great Bear batholith.

A 100 m wide fault zone trending northwesterly across the strike of the supracrustal rocks contains a number of mineralized veins. These are composite, complex and sinuous, containing mineralized pods surrounded by an alteration halo, which includes silicic and hematitic, chloritic and carbonate phases (Badham, 1975).

Mineralization includes more than 10% sulphides, mainly pyrite, pyrrhotite and chalcopyrite with a mixture of argentite, cobalt and bismuth arsenides, native silver and native bismuth. The silver-bismuth-cobalt minerals are concentrated in quartz-carbonate-hematite veins along fractures perpendicular to the zone and are considered younger than the disseminated copper mineralization (Shegelski, 1973). Other vein minerals are skutterudite, safflorite, rammelsbergite, pararammelsbergite, matildite and sphalerite.

Ore-grade mineralization is found mainly in the Echo Bay andesite or the underlying Camsell River Formation and appears to have a spatial relationship with the monzonite and syenitic suite (Hildebrand, 1978).

CURRENT WORK AND RESULTS

Production was slightly lower than 1977 as more effort was expended on development of the Northern Zone and on shaft ventilation raise construction. The decline was advanced to the 1,300 level, and millfeed produced from the 100, 200, 300, 600, 1,200 and 1,300 levels.

In 1978, 7,873 m of underground drilling were completed.

Development of the North Zone on the 610 level has explored the 54, 55 and 56 veins, of which the 54 vein has proved the most interesting. Underground drilling has indicated two additional veins (52 and 53) to the west of these. The veins strike roughly east-west and dip to the south at 70° to 80°. At present 15-20,000 tons of ore grading 30 oz/Ag and 2 lbs/ton U_3O_8 have been indicated.

Surface deep-hole drilling was concentrated to the east of present workings. Only two holes were drilled to the west. Several holes intersected the peripheral sulphide zone: one hole 1,372 m south-east of the mine intersected 1.62% Cu over 6.52 m at a depth of almost 189 m.

PRODUCTION DATA: TERRA MINE

Year	Tons Milled Daily	Tons Milled in Year	Grade Ag oz/Ton	Grade Cu %	Production Ag oz	Production Cu lbs.
1976	126	46,090	43.5	0.15	1,900,991	142,176
1977	80	26,051	35.8	0.27	1,040,984	157,800
1978		29,070			663,697	46,406

NOREX MINE
Terra Mining & Exploration Ltd.,
P.O. Box 5000,
Hay River, N.W.T.

Silver, Bismuth
86 F/1
65°35'N, 117°58'W

REFERENCES

Badham (1975); Blackwell (1974); Hildebrand (1981); Padgham and others (1975); Shegelski (1973).

PROPERTY

ITLDO 2-7,10-13

LOCATION

The Norex Mine is 10 km by all-weather road from the Terra Mine, on the south shore of Silver Bay, part of the Camsell River (Fig. II-8). A 1,000 m gravel airstrip is located 1.6 km from the property and is connected to it by a short all-weather gravel road.

HISTORY

The principal silver showings were discovered in 1932, by Don McLaren for the A.X. Syndicate and staked as the ELITE claims. White Eagle Silver Mines was formed in 1933 to take over the ELITE and six other claim groups from the Syndicate. Stripping and test pitting was done on five veins. The ground was dropped but restaked in 1945-46 by A.V. Giauque and Associates as the F and H group and acquired in 1946 by Camsell River Silver Mines Limited. Dropped again, it was restaked by J.M. Harriman, in 1960, as the 13 ITLDO claims. Caesar Silver Mines Limited was formed in 1967 to explore the ITLDO group and then staked additional

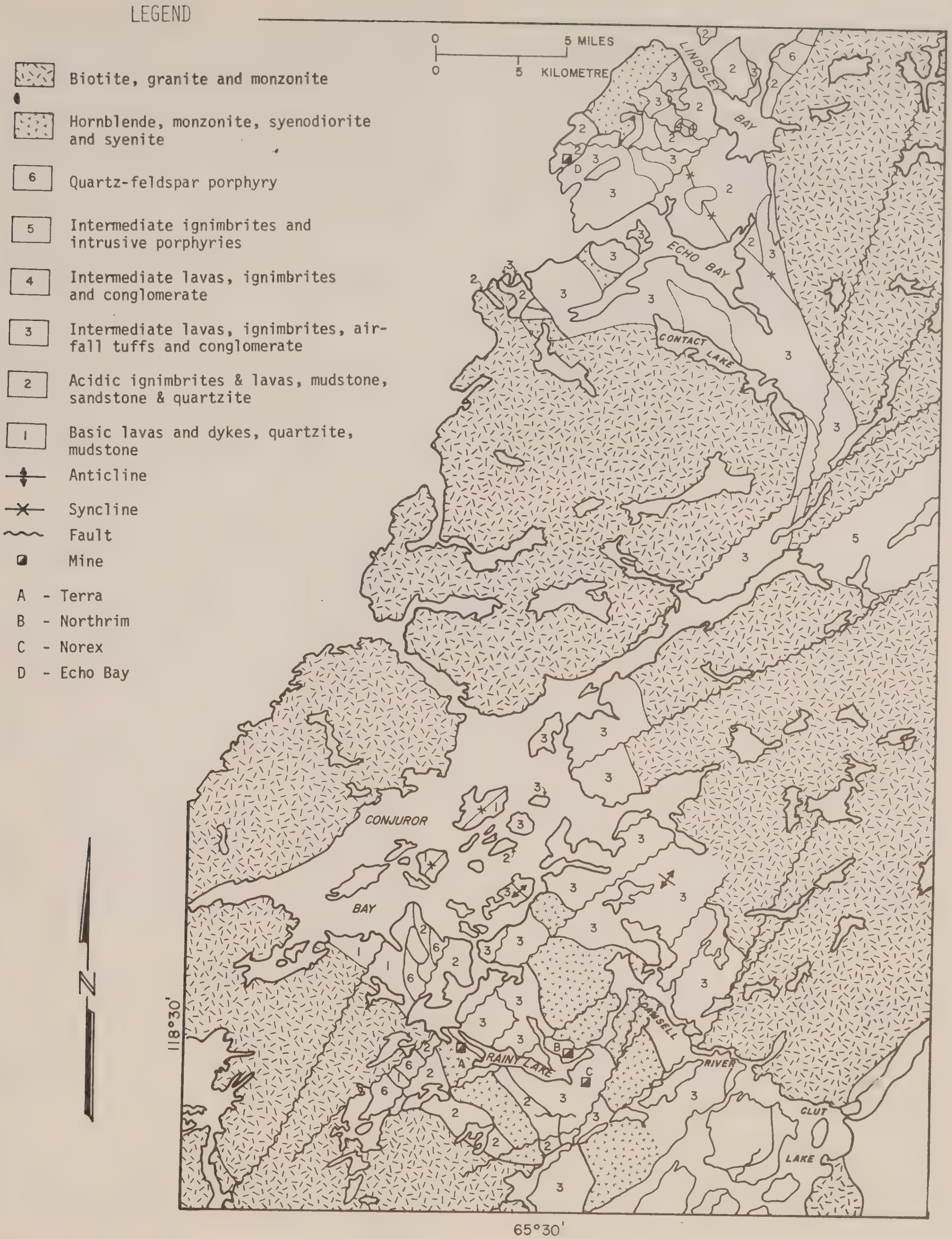


FIGURE II-8: Geology of Echo Bay/Camsell River area after Hoffman and others, 1976.

claims in the area. During 1968, trenching, drilling and an adit and raise driven on the Graham vein indicated about 2,000 tons of high grade silver ore recoverable by open pit.

Caesar Silver Mines Limited optioned the property in 1969 to Norex Uranium Limited, who did additional sampling and drilling of the main zone. Open pit extraction began in 1970, when Norex Resources Ltd. exercised its option, and 54.5 tons of ore were shipped to Cominco and American Smelting and Refining to yield 109,502 ounces of silver. An additional 975 tons of ore milled at Echo Bay Mine yielded 73,750 ounces.

Terra Mining and Exploration Ltd. optioned the Norex property in late 1971 and the ore stockpile, estimated at 2,500 tons containing about 250,000 ounces of silver, was trucked to the Terra mill.

In 1976 Caesar Silver Mines and Norex Uranium Ltd. amalgamated under the name of Norex Resources. This company entered an equal partnership, joint venture agreement with Terra Mining and Exploration Ltd. to develop and explore the property, and 350 m of decline haulageway was driven to intersect the Graham Vein.

DESCRIPTION

The country rocks are Aphebian andesitic lavas and pyroclastics of the Echo Bay Group (Shegelski, 1973), commonly impregnated with metamorphogenic sulphides (Badham, 1975).

Five parallel east-southeast trending veins occupy a 99 m wide zone of chlorite-epidote alteration and are emplaced in tension fractures between major northeast trending faults (Badham, 1975). The Graham Vein is about 200 m long, dips vertically and consists mainly of quartz and carbonate. Ore lenses in dilational parts of the vein contain native silver, native bismuth, hematite and a variety of sulphides, silver and cobalt arsenides. The mineral suite is comparable to those of the nearby mines but the ore appears to be more silicious and to contain less carbonate, uranium , phosphate and antimony rich minerals (Blackwell, 1974).

CURRENT WORK AND RESULTS

In 1978 7,837 tons of high grade ore were mined from the 300 foot level and milled at Terra Mine. Extension of the main decline to the 400 foot level was begun.

Thirty-one holes, totalling 1,401 m, were drilled on the Graham Vein, confirming the continuation of good silver values at depth. The best intersection assayed 5,774 oz/ton Ag over 0.21 m.

Ten short drill holes on the Smallwood Lake Zone, about 760 m southeast of the Graham Vein, intersected at least 4 parallel veins striking WNW. Two of the holes intersected good silver values.

PRODUCTION DATA: NOREX MINE

Year	Tons Milled in Year	Grade oz/ton Ag	Grade Cu %	Grade Pb %	Production Ag oz	Production Cu lbs	Production Pb lbs
1977	7,908	56.4	0.06	-	447,056	8,899	
1978	7,837	98.4	0.28	1.08	770,946	44,611	170,543

NORTHRIM MINE
Northrim Mines Limited,
206, 640-11th Avenue S.W.,
Calgary, Alberta

Silver, Bismuth, Lead
86 F/12
65°36'N, 117°58'W

REFERENCES

Badham (1975); Hildebrand (1981); Hoffman and others (1976); Padgham, Kennedy and others (1975); Padgham, Shegelski and others (1974); Thorpe (1972).

PROPERTY

LM 1-8

LOCATION

The property is on the north shore of Camsell River, about 393 km northeast of Yellowknife (Figs. I-1, II-8).

HISTORY

The OTTER claims were staked for A.X. Syndicate in 1932 to cover silver-bearing veins. In 1933 White Eagle Silver Mines Limited acquired the claims and drove an adit on the main vein. In 1946, geological mapping, trenching and 533 m of diamond drilling in 26 holes east of the adit by Camsell River Silver Mines Limited outlined an 80 m long, 2 m wide ore shoot averaging 34 oz/ton Ag. A fifty-four pound sample fromm this shoot assayed 2,442 oz/ton Ag and 7.3% Pb. The claims lapsed and were restaked as LM 1-8 by F. Lypka in 1962. In 1967 four to six tons of rock averaging 438 oz/ton Ag were mined. In 1968 Silver Bay Mines Limited drove a 50 m adit with three raises. Samples assayed from 20 to 450 oz/ton Ag over a 1 to 1.5 m width. In 1970 Federated Mining Corp. Ltd. acquired an interest in the property, renovated the underground workings and stockpiled 3,000 tons. A 100-ton per day mill operated from December, 1971 until June, 1972. In 1973 Federated Mining Corp.'s Camsell Holdings Limited which operated the mine, was acquired by Northrim Mines Limited.

By December, 1976 a decline had been driven to the second level, developemnt of the number 1 vein was underway and the mill was reported to be producing at 50 tons per day.

DESCRIPTION

The property is underlain by Aphebian volcanics (Fig. II-8) including hornblende meta-basalt, andesitic lava and air-fall tuff intruded by a syenite-monzonite complex to the north (Hoffman and others, 1976; Morton, personal communication, 1978). The volcanics contain varying amounts of pyrite and chalcopyrite.

A number of veins fill east-striking tension fractures between two northeast-trending faults. The number 1 and 2 veins dip to the southeast at approximately 60° and appear to converge at depth (Morton, personal communication, 1978). Both of the veins appear to be simpler, though much wider, than those at the Terra Mine and wall-rock alteration is far less marked, with carbonates, chlorite, hematite and epidote in a narrow halo around the veins (Badham, 1975).

The veins consist of quartz and carbonate with pods of pyrite, arsenopyrite, chalcopyrite, safflorite, rammelsbergite, hematite, argentite, niccolite and native silver in dilation zones. Radioactivity associated with the number two vein has been noted.

CURRENT WORK AND RESULTS

The decline was advanced to the 4th level (103 m) and development begun on No. 1 vein at this level. Silver mineralization, estimated at 1,500 tons grading 100-150 oz/ton, was reported in the 4th level east drift.

Lateral development on the 120 level encountered silver along a 15 m length, reported to average 1,100 oz/ton Ag.

The mine closed in June due to a lack of working capital after milling 4,139 tons of ore to produce 15,000 oz Ag.

ECHO BAY MINE	Silver, Copper
Echo Bay Mines Ltd.,	86 K/4, L/1
500, 10909 Jasper Avenue,	66°06'N, 118°00'W
Edmonton, Alta., T5J 1Y6	

REFERENCES

Campbell (1955); Hildebrand (1980); Jory (1964); Lord (1951); Mursky (1973); Padgham, Kennedy and others (1975); Robinson (1971); Robinson and Ohmoto (1973); Schiller (1965); Schiller and Hornbrook (1964); Thorpe (1966, 1972).

PROPERTY

ECHO BAY 1-10, SUKI 1-7, WHISKY 1-5, MONTY 3, 14, RUST 21-24, 27-29, FT 1, 3-8, 10-12, 15, 17-24, 29, 31-35, COBALT 1-17, COBALT EX 13, 16-22, 24, 25, RAY 5-7.

LOCATION

Echo Bay Mine is 1.6 km northeast of Port Radium, the site of the Eldorado Mine, on Great Bear Lake (Figs. I-1, II-8,9). The mines are serviced by ice or gravel airstrips.

HISTORY

The Eldorado deposit was staked in May, 1930 by G.A. Labine and E.C. St. Paul for Eldorado Gold Mines Limited. Underground work commenced in 1932 and a 50-ton per day gravity concentration plant started producing radium and silver in 1933.

The mine was expanded in the late 1930's but was closed in 1940 because of a poor radium market. In 1942 the mine reopened to provide uranium for the Manhattan project and in 1944 became a Crown company, Eldorado Mining and Refining (1944) Ltd., producing uranium, radium and silver. Radium was not recovered after 1950 because of competition from artificial isotopes. The concentrator capacity was increased to

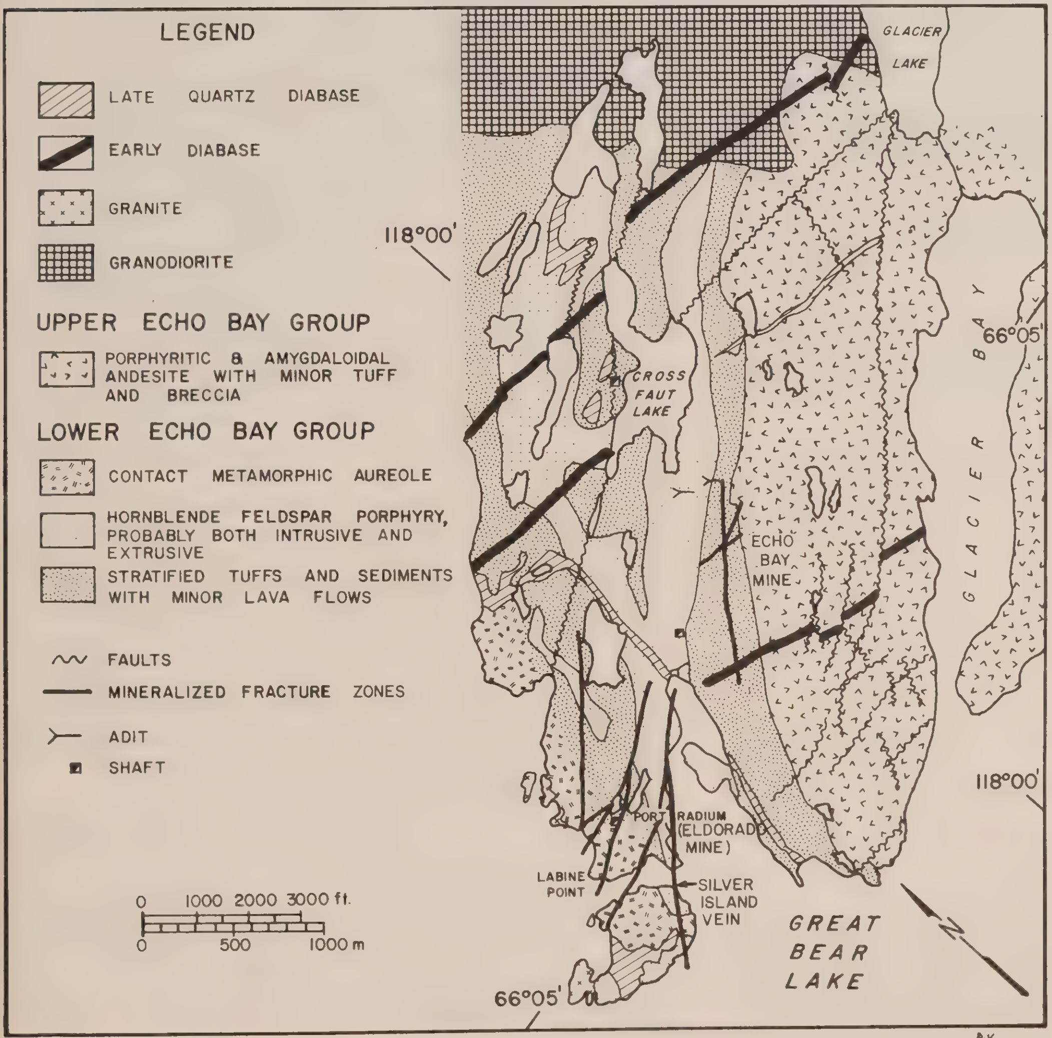


FIGURE II-9: Geology of the Echo Bay Mine Area (after A.W. Jolliffe and J.D. Bateman, 1944).

170 tons per day in 1950 and a 300 ton per day acid leach plant installed in 1952 to treat tailings. In September, 1960 ore reserves were exhausted and the mine closed. Total production since 1942 is estimated at 13,000,000 lbs. U_3O_8, 1,500,000 oz Ag, 450 grams Ra and minor copper, cobalt, nickel, lead and polonium.

In 1963 Echo Bay Mines Limited acquired the Echo Bay deposit from Consolidated Mining and Smelting and commenced production in October, 1964. Echo Bay Mines purchased the Eldorado plant and mill in 1966, and in 1974 began dewatering the Eldorado workings. By 1976 the number 1 shaft had been dewatered to 257 m and extensive development carried out.

DESCRIPTION

The area is underlain by northeast striking andesite tuffs, lava and a series of volcaniclastic sediments of the Echo Bay and Port Radium Formations (Hildebrand, 1980). Within the mine the sediments and volcanics dip 35° to 45° to the southeast, and are intruded by irregular feldspar porphyry bodies (Cobalt porphyry member of the Echo Bay Formation) that have caused severe local deformation of the sediments. Diabase dykes cut the entire sequence (Fig. II-9).

The Echo Bay and Eldorado deposits are in a lenticular network of northeast trending, steeply dipping shear zones. Quartz-carbonate veins filling tensional fractures at various places along the shears are accompanied by wall-rock alteration that includes hematization and chloritization (Campbell, 1955). Argentite, native silver, galena, sphalerite, niccolite, pitchblende, hematite, chalcopyrite and bornite are erratically distributed throughout the veins but appear to be concentrated where the veins cut pyrite and chalcopyrite-rich sediments and tuffs. The higher ore grades are generally found within sediments adjacent to contacts with the feldspar porphyry (Moffett, personal communication, 1978).

CURRENT WORK AND RESULTS

Development and production was concentrated on the 'D' or 'Silver Island' vein on the 650 foot level. Drilling on the 'D' vein at the 800 foot level has indicated about 3,000 tons of ore, bringing reserves up to 33-34,000 tons grading 55 oz/ton Ag.

PRODUCTION DATA: ECHO BAY MINE

Year	Tons Milled Daily	Tons Milled in Year	Grade Ag oz/ton	Grade Cu%	Production Ag oz.	Production Cu lbs.
1976	108	39,387	47.2	1.1	1,866,000	879,000
1977	93	34,243	11.7	0.7	2,113,967	536,720
1978	104	37,278	N/A	N/A	2,299,798	524,399

CANTUNG MINE — Tungsten, Copper
Canada Tungsten Mining Corp. Ltd.,
P.O. Box 9,
Tungsten, N.W.T.
105 H/16
61°57'N, 128°15'W

REFERENCES

Archibald and others (1978); Blusson (1968); Brown (1961); Cummings and Bruce (1976); Findlay (1967, 1969); Gabrielse and others (1973); Green (1965, 1966); Green and Goodwin (1963, 1964); Laporte and others (1978); Skinner (1961, 1962); Zaw (1976).

PROPERTY 612 continuous claims covering 31,719 acres.

LOCATION Cantung Mine lies near the headwaters of the Flat River in the Selwyn Mountains, 209 km north of Watson Lake and less than 3 km from the Yukon border (Figs. I-1, II-10). Access is by 306 km of all-weather gravel road from Watson Lake or via a 1,219 m gravel airstrip at the minesite.

HISTORY The area was staked as a copper prospect in 1954 but lapsed and was restaked for tungsten in 1958. In 1959 Canada Tungsten Mining Corp. Ltd. was formed to develop the property and by 1960, 3,658 m of diamond drilling had outlined 1,320,000 tons grading 2.4% WO_3 and 0.5% Cu. Open pit mining began in 1961 and continued until 1973. Remaining mineralization in the pit is estimated at 250,000 tons of skarn ore at 1.35% WO_3 and 615,000 tons of chert ore at 0.80% WO_3.

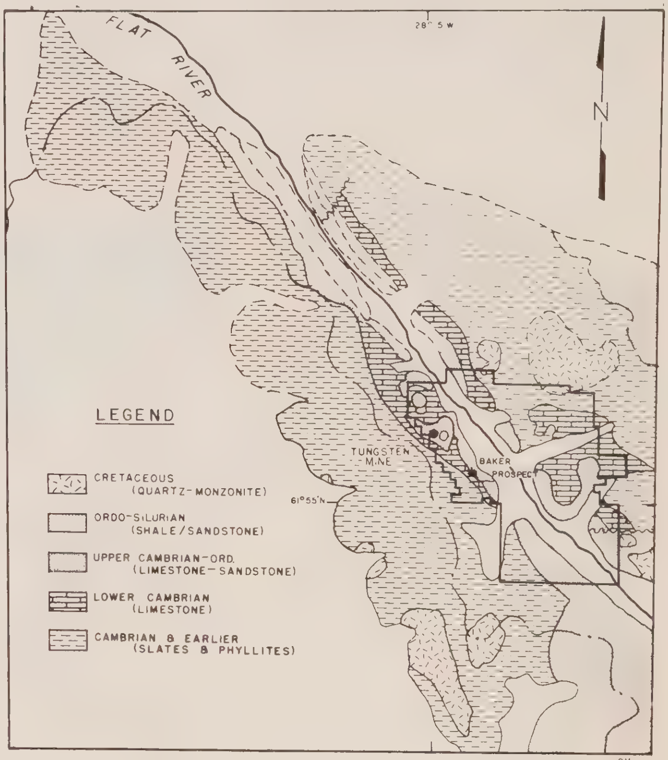


FIGURE II-10: Geological sketch map showing Canada Tungsten Mining Corp. Ltd's property in the Flat River area (geology after Gabrielse and others, 1973)

In 1971 drilling intersected ore grades 615 m north-northwest of the pit. By 1973 4,242,000 tons grading 1.68% WO_3 and 0.22% Cu had been outlined. In 1974 the operation switched from open pit to underground mining.

DESCRIPTION The mine area is underlain by a north-northwest trending syncline of Lower Paleozoic argillite, limestone, dolomite and chert (Fig. II-10, II-11). On the flank of the syncline is an overturned anticline of Lower Cambrian strata. Within the anticline a Cretaceous quartz monzonite, known as the mine stock, has altered the Ore Limestone to a skarn that hosts the orebodies.

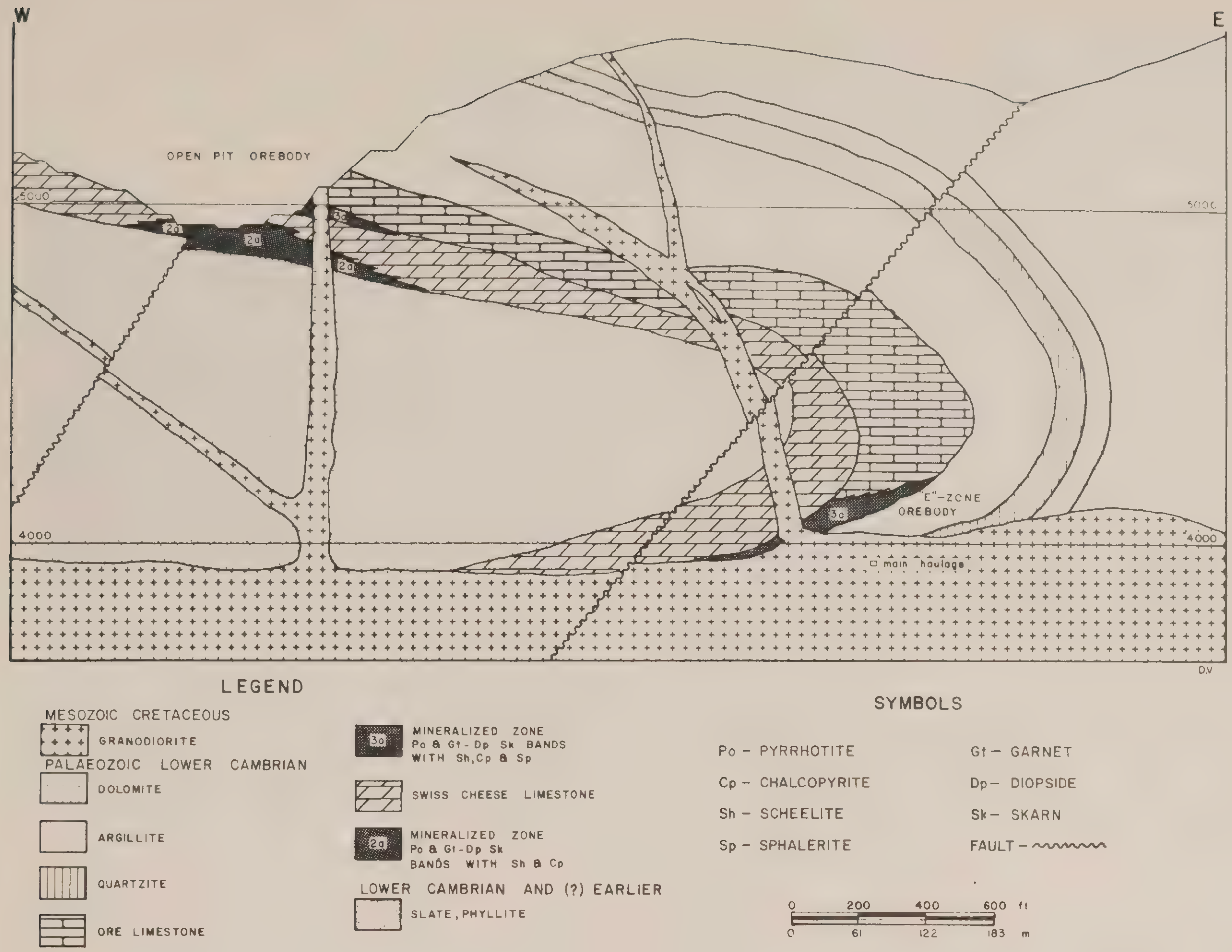


FIGURE II-11: Cantung Mines; typical cross-section (from W.W. Cummings, 1976).

The pit orebody, a shallow, southwest-dipping lens about 91 m wide and 20 m thick, lies about 300 m above the roof of the mine stock. It consisted of a fine-grained clinopyroxene-garnet skarn containing massive, disseminated and vein pyrrhotite with scheelite, chalcopyrite and sphalerite. This was cut by quartz-microcline-scheelite veins. The low grade chert zone contains scheelite and pyrrhotite.

The E-Zone underground orebody is over 600 m long, averages 12 m thick and is dominated by a coarse-grained calciferous amphibole and magnesian biotite. Zaw (1976) demonstrated that the E-Zone has an internal zoning broadly conformable to stratigraphy, comprising an upper zone of hedenbergite pyroxene and Fe-Mn rich grossular, an intermediate amphibole-rich zone and a lower (footwall) biotite skarn. The skarn contains non-magnetic pyrrhotite, scheelite, chalcopyrite and sphalerite.

The underlying stock is cross-cut by numerous uneconomic, scheelite-bearing quartz veins with greisen margins.

Mineralization appears to have replaced the ore limestone at a temperature of about 450°C, at shallow depth (1,000 bars) and over a short period of time. The locus of skarnification and mineralization migrated towards the roof of the mine stock as it cooled (Zaw and Clark, 1978; Archibald, Clark, Farrar and Zaw, 1977).

CURRENT WORK AND RESULTS

Work continued on the mine expansion to be completed in 1979. Record production increased concentrate output by 31% and concentrate grade by 16%.

The main underground development and exploration was on the west end of the E-Zone, where the orebody continues down dip with significant thickness and grade. One drill hole intersected 3 mineralized sections 6-12 m thick, grading 2-3% WO_3 with variable zinc and copper values.

Drilling and drifting outlined 180,000 tons of ore, maintaining reserves at 4,200,000 tons grading 1.55% WO_3.

Geological, geochemical and geophysical surveys, of anomalous zones found in 1977 led to the staking of 125 claims.

PRODUCTION: CANTUNG MINE

Year	Tons Milled	Tons Milled	Grade WO_3%	Production WO_3 lbs.
1976	516	188,934	1.55	4,799,960
1977	535	185,629	1.65	5,036,160
1978	535	194,740	1.96	6,361,700

ARCTIC ISLANDS REGION

Walter A. Gibbins,
Arctic Islands District Geologist,
D.I.A.N.D., Geology Office, Yellowknife.

The Arctic Archipelago includes all or parts of several major geological provinces. Precambrian rocks of the Canadian Shield are exposed in the Minto Arch, Boothia Uplift, and Baffin Island and form a crystalline basement under much of the younger sedimentary cover. The north-trending Cornwallis Fold Belt, which divides the Arctic Platform and Franklin Geosyncline into eastern and western parts, developed mainly in Silurian and Devonian time in response to periodic faulting caused by movements of the Boothia Uplift. The Sverdrup Basin, which in late Proterozoic and Mesozoic time was superimposed on the folded Franklin Geosyncline, was itself folded in the Cenozoic. Relatively undisturbed Proterozoic sediments occur in several parts of the Arctic Islands, notably Northern Baffin, Victoria, Somerset and Ellesmere Islands.

Regular jet service is available to Resolute Bay, Nanisivik, Frobisher Bay, Cambridge Bay and Inuvik. Most Arctic settlements have scheduled Twin Otter flights at least once a week; camp-moves and re-supply flights for exploration crews are usually chartered Twin Otters equipped with oversize tires for landing directly in the Arctic tundra. These aircraft are available in Resolute Bay, Frobisher Bay and Hall Beach.

ACKNOWLEDGEMENTS

The author gratefully acknowledges continuing aircraft and logistical support provided by the Polar Continental Shelf Project and their staff.

CAPE DORSET PROJECT
TED, HEW, RAY CLAIMS — Uranium
Esso Minerals Ltd., — 36 B/5, C/6-8
2300 Yonge Street, — 64°20'N, 76°20'W
P.O. Box 4029, Terminal A,
Toronto, Ont., M5W 1K3

REFERENCES

Blackadar (1959, 1962, 1967); Gibbins (1979a); Gratto (1977); Laporte (1974a); Maurice (1975, 1977).

PROPERTY

18 TED	36 B/5
33 HEW	36 C/6-7
16 RAY	36 C/8

LOCATION

The HEW group is 25 km north-northwest of Cape Dorset on southwestern Foxe Peninsula, Southern Baffin Island. The TED and RAY claims are about 25 km north to northeast of the settlement (Fig. III-1, numbers 1 and 4).

HISTORY

In 1967, Mr. Ross Toms interested the Snowdrake Syndicate in uranium possibilities on Southern Baffin Island and did airborne radiometric surveys on their behalf. Anamalous radioactivity was detected in the Cape Dorset area.

In 1969 the Kabluna Syndicate obtained several exploration permits in southern Baffin Island, including two in the Cape Dorset area (36 B/5 and C/8). Numerous radioactive anomalies were outlined in a belt of paragneiss, marble, granite and pegmatite between Cape Dorset and Andrew Gordon Bay. The TIM, PAT and DON claims were staked in NTS 36 C/8 (Laporte, 1974a, p.138-139, Fig. III-1; No. 2,5 and 6). The most significant find is on the TIM claims where uranium and thorium occur in a zone of biotite paragneiss and concordant granite pegmatite at least 579 m long and from 15 to 76 m wide. The average grade of 25 selected samples was 1.16 lbs/ton U_3O_8 and 0.54 lbs/ton ThO_2. The highest-grade sample assayed 6.80 lbs/ton U_3O_8 and 1.08 lbs/ton ThO_2. In many places the outcrop surface is heavily stained by secondary uranium minerals. Uraninite is the source of most of the radioactivity in fresh pegmatite samples. Maurice (1977) observed molybdenite in several hand specimens.

In 1975 Imperial Oil Limited surveyed the area north of Cape Dorset using a helicopter-mounted scintillometer and examined 51 anomalies on the ground. Five claim groups were staked as a result of this survey. In 1976, 16 of these zones were prospected and mapped at 1:62,500. Additional airborne radiometric anomalies were detected and examined and the RAY claims staked (Gibbins, 1979a).

DESCRIPTION

Southern Baffin Island consists of a complexly folded, generally northwest-trending succession of granite, migmatite, and quartz-feldspar gneiss which commonly contain layers of diopsidic marble, graphitic schists, quartzites and mafic schists and gneisses. These were last affected by metamorphism 1,650 to 1,750 million years ago during the Hudsonian Orogeny (Blackadar, 1959, 1962 and 1967).

In the area northeast of Cape Dorset, radioactivity is restricted to biotite rich pegmatite and grey gneiss (Gratto, 1977). Where biotite is absent, radioactivity is confined to the edges of red feldspar grains. The radioactivity emanates from euhedral to subhedral uraninite grains of somewhat variable thorium content, but consistent U/Pb. Commonly uranium has been leached by meteoric water and redeposited as yellow, secondary uranium minerals in fractures and on weathered surfaces.

Gratto (1977) suggests that radioactive pegmatites may have been derived from anatexis of uranium rich arkosic sediments. Later intrusive granites may have produced the non-radioactive pegmatites of the area.

CURRENT WORK AND RESULTS

Exploration in 1978 consisted of 960 m of diamond drilling and ground radiometric surveying on three mineralized zones. Drilling indicates that all the zones are small and do not continue at depth.

Zone 35 (HEW claims 64°17'N, 77°04'W, 36 C/6,7)
Uranium occurs in narrow lenses of biotite and chlorite filled shears in a rusty contorted pegmatite bed.

Zone 141 (TED claims 64°25'30"N, 67°49'W,36 B/5)
High concentrations of uranium occur in a small reddish pegmatite lens on the coast of Andrew Gordon Bay. Yellow staining caused by the weathering of uraninite is abundant.

Zone 215 (RAY claims 64°28'N, 76°09'W, 36 C/8)
This is a highly radioactive exposure of pegmatite and grey gneiss averaging 0.65 lbs/ton U_3O_8 over 29 m at surface. Drilling indicates about 75,000 tons grading 1.00 lbs/ton U_3O_8 to a depth of 60 m.

TR CLAIMS
Shell Canada Resources Ltd.,
Minerals Division,
P.O. Box 100,
Calgary, Alta., T2P 0H5

Zinc, Lead
48 A/13, B/16
74°54'N, 83°29'W
75°57'N, 84°W

REFERENCES

Blackadar (1970); Blackadar and others (1968a, b, c); Geldsetzer (1973a and b); Jackson and others (1978); Laporte (1974a); Olson (1977); Padgham and others (1976).

PROPERTY

42 TR claims at Hawker Creek (48 A/13)
14 TR claims at Chris Creek (46 B/16)

LOCATION

Hawker Creek and Chris Creek are 38 and 13 km southeast of Nanisivik respectively (Figure III-2).

HISTORY

In 1969, King Resources Ltd. acquired several prospecting permits southeast of the Strathcona Sound (Nanisivik) lead-zinc deposit. Exploration programs involving regional mapping, prospecting, geochemistry and geophysics (airborne EM) were done for King Resources Ltd.-Global Arctic Island Ltd. in 1969, 1970 and 1973 (Laporte, 1974a and Padgham and others, 1976). This work led to the discovery, staking and more detailed evaluation of mineralization in several areas including the Hawker Creek and Chris Creek areas.

In 1974 Mineral Resources International Ltd. optioned the Hawker Creek claims and did EM surveys and 490 m of drilling. However, as EM conductors tended to correlate with diabase dykes and only minor amounts of barren pyrite were encountered by the drilling, the option was dropped.

In 1977 Shell Canada Resources Ltd. acquired an option and conducted gravity, geological and geochemical surveys at Hawker Creek.

DESCRIPTION

The Nanisivik zinc-lead-silver mine and associated showings are stratigraphically confined to the Society Cliffs Formation, which also occurs at Chris Creek, Hawker Creek and elsewhere on Borden Peninsula. The Society Cliffs Formation is part of a thick sequence of Upper Proterozoic sedimentary and volcanic rocks originally described and mapped by Blackadar (1970, 1969a-c) and more recently by Jackson and others 1978). The Society Cliffs Formation is characterized by thick to massive beds of regularly laminated, brownish grey to grey stromatolitic dololutite and dolosiltite. Planar stromatolites are ubiquitous; low domal varieties are common and cabbage -head types are less common (Jackson and others, 1978). In some areas, including Hawker Creek, there is a nodular, irregularly laminated, algal dolomite

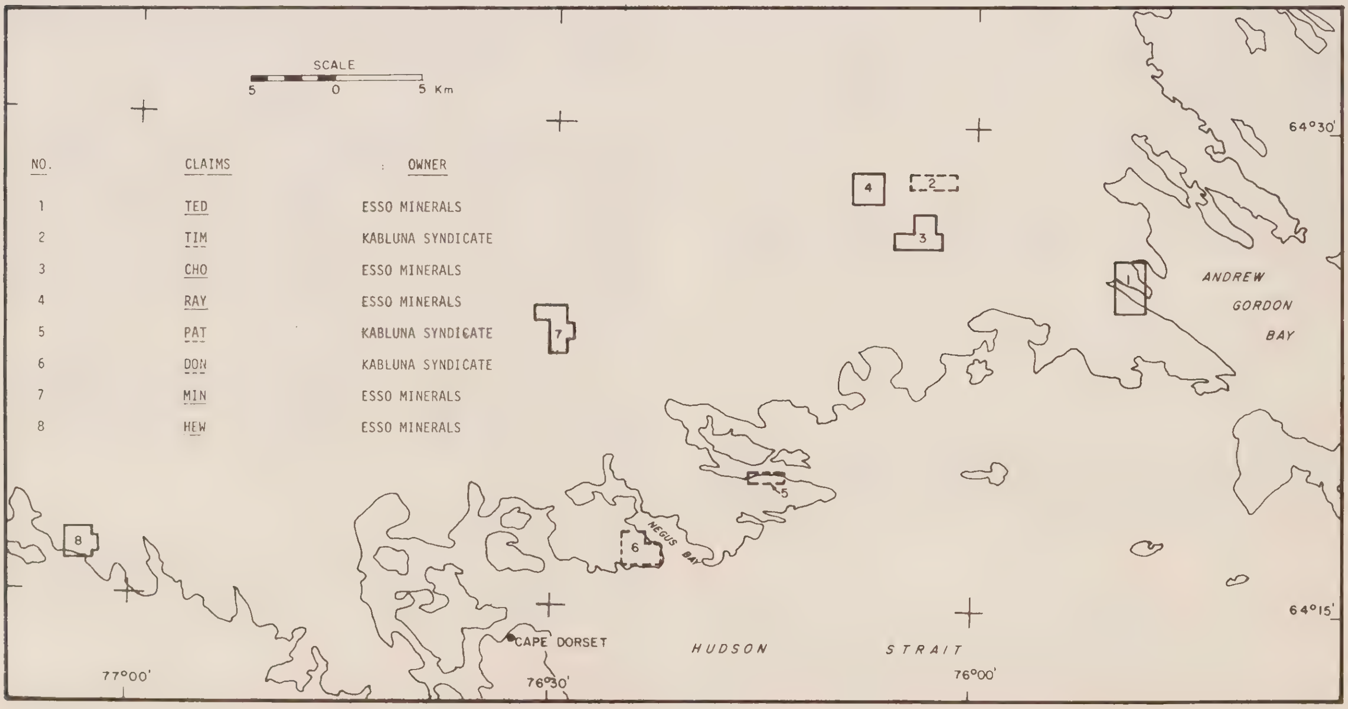


FIGURE III-1: Mineral Claims - Cape Dorset area

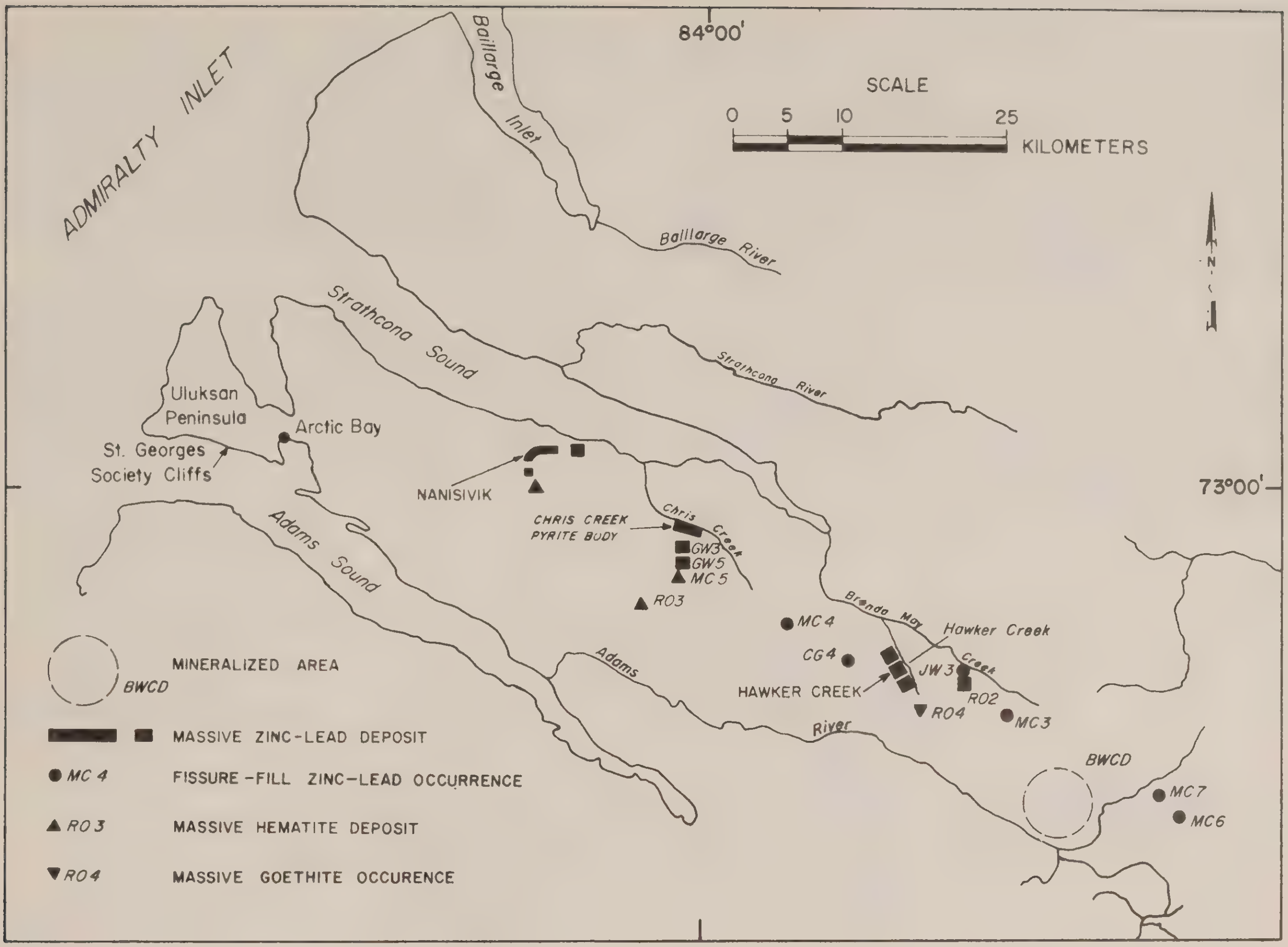


FIGURE III-2: Mineral Deposits - Borden Peninsula

facies, which may be analogous to supratidal nodular dolomite forming in modern sabkha environments. A strong fetid, petroliferous odour is characteristically given off by freshly broken rock. Dolomite breccia is common in the Society Cliffs Formation and much of this brecciation can be related to early karsting in the area (Geldsetzer, 1973a and b, and Olson, 1977).

At Hawker Creek, the Society Cliffs Formation is locally overlain by a thin veneer of Victor Bay Formation shale. Rocks dip less than 15^{o}, and a thin layer of felsenmeer and drift covers about 80% of the area. Several massive pyrite and zinc-lead occurrences have been found (Olson, 1977). Nanisivik-like mineralization in trench SH 25-1 consists of banded, coarse grained sphalerite with minor galena, carbonate and abundant massive pyrite and has an average grade of 15.4% zinc and 1.6% lead. Crossbedding, scour, slump and onlap structures suggest that sulphides were deposited and reworked within the caverns (Olson, 1977). Goethite gossans, sulphide fragments in dolostone and sulphide crystals in sparry dolomite veins or fractures also occur in the vicinity of Hawker Creek (Olson, 1977).

At Chris Creek, recent stream erosion has exposed a small massive pyrite deposit (Plate XVI, Olson, 1977), which is up to 1.21 m wide, 2.42 m high and at least 600 m long within the Society Cliffs Formation. Sphalerite and galena are not present although they occur nearby as fissure-fillings.

CURRENT WORK AND RESULTS

In July and August, 1978, 910 m were drilled in 17 holes at Hawker Creek to test geophysical and geochemical anomalies outlined in 1977. The 1977 mapping, geochemical and gravity surveys were extended and some vertical loop, VFL and Crone pulse EM work was done. Similar surveys were also done at Chris Creek, but no new drill targets were found in either area.

One barren pyrite tube some 7 m thick was intersected at Hawker Creek. The length of the tube was not established by geophysics, but it could be 1-2 km in length. Several other holes intersected narrow sections of Nanisivik-type lead-zinc sulphides. It was concluded that the sulphides intersected in drilling and cropping out in the Hawker Creek area formed through infilling of karst structures (small tubes and down-cutting canyons) in the upper reaches of an intrastratal karst system.

Regional structure and stratigraphic mapping revealed the degree to which block faulting and accompanying erosion, related to the economically important karst episode II (Olson, 1977), affected parts of Borden Peninsula. This can best be seen in

the vicinity of Chris Creek, from Strathcona Sound southwest to the area of mineral showing R03 (Figure III-2). Along this line of section quartz sandstones of the lower Strathcona Sound Formation form a sub-horizontal datum, resting with various degrees of angularity on progressively older strata from north-east to southeast. In the northeast the Strathcona Sound Formation overlies the Victor Bay Formation; in the vicinity of mineral showing R03 the formation overlies the Arctic Bay Formation. Across this line of section the entire Victor Bay and Society Cliffs Formations were eroded during karst episode II.

EASTERN FACIES FRONT PROJECT	Zinc, Lead, Copper
PROSPECTING PERMITS 505-507	58 G/2,3
CAPE, TERN CLAIMS	75^{o}-75^{o}5'N
Canadian Superior Expl. Ltd.,	93^{o}-94^{o}30'W

P.O. Box 10104,
Pacific Centre, 18th Floor,
701 W. Georgia Street,
Vancouver, B.C. V7Y 1C6

REFERENCES

Gibbins (1978a); Kerr (1977a and b); Thorsteinsson (1958); Thorsteinsson and Kerr (1968).

PROPERTY

CAPE 1-54
TERN 1-47

Prospecting Permit 505	58 G/2 NW
Prospecting Permit 506	58 G/2 SW
Prospecting Permit 507	58 G/3 NE

LOCATION

The permits and claims are on central eastern Cornwallis Island. The TERN claims are 5 miles west of Separation Point and include dolomites of the Allen Bay Formation. The CAPE claims include most of the Read Bay Formation between Snowblind Bay and Cape Rescue. The permits include all of the remaining Eastern Facies Front (Fig. III-3).

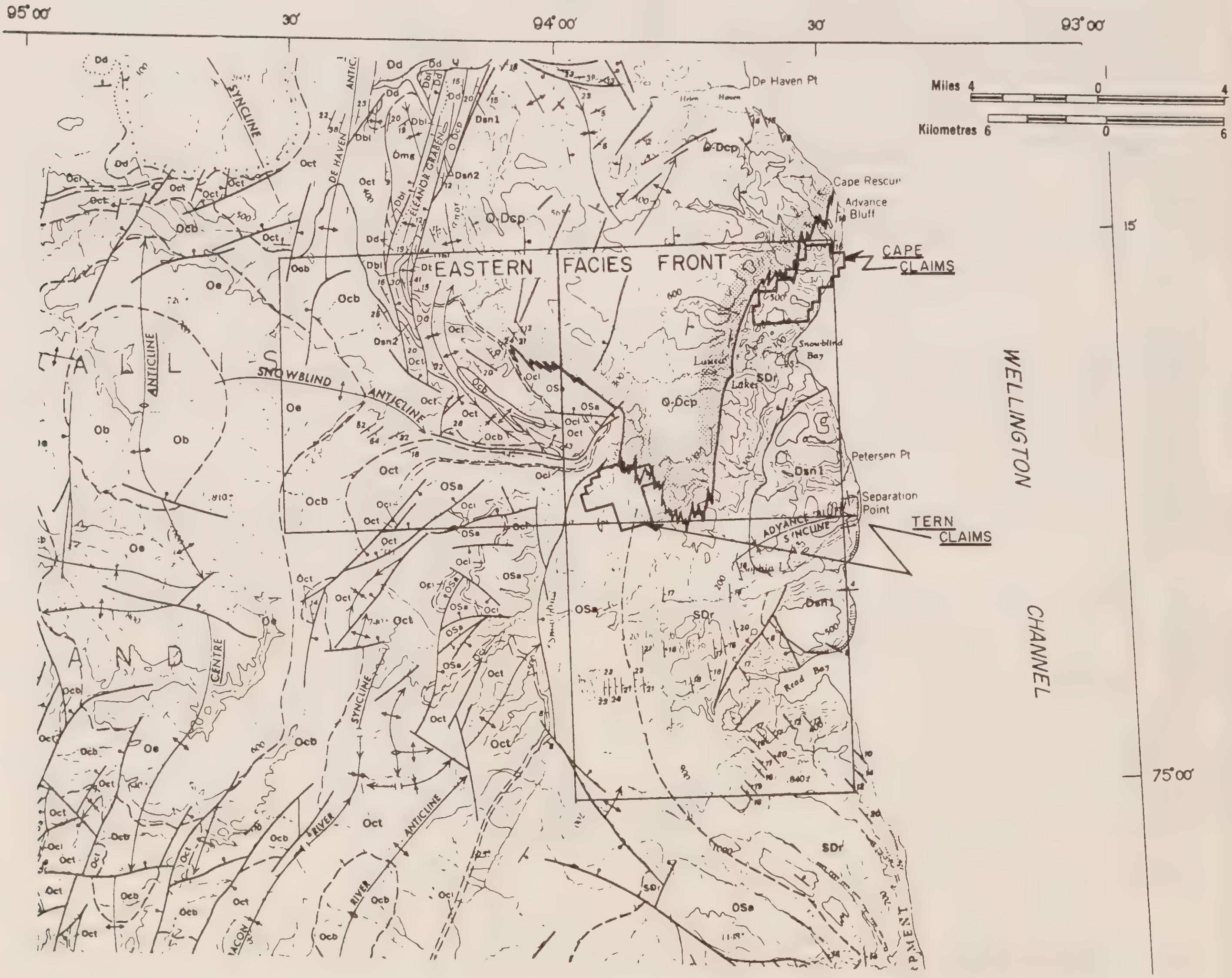


FIGURE III-3: Geology of the Eastern Facies Front, Eastern Cornwallis Island from Thorsteinsson and Kerr (1968).

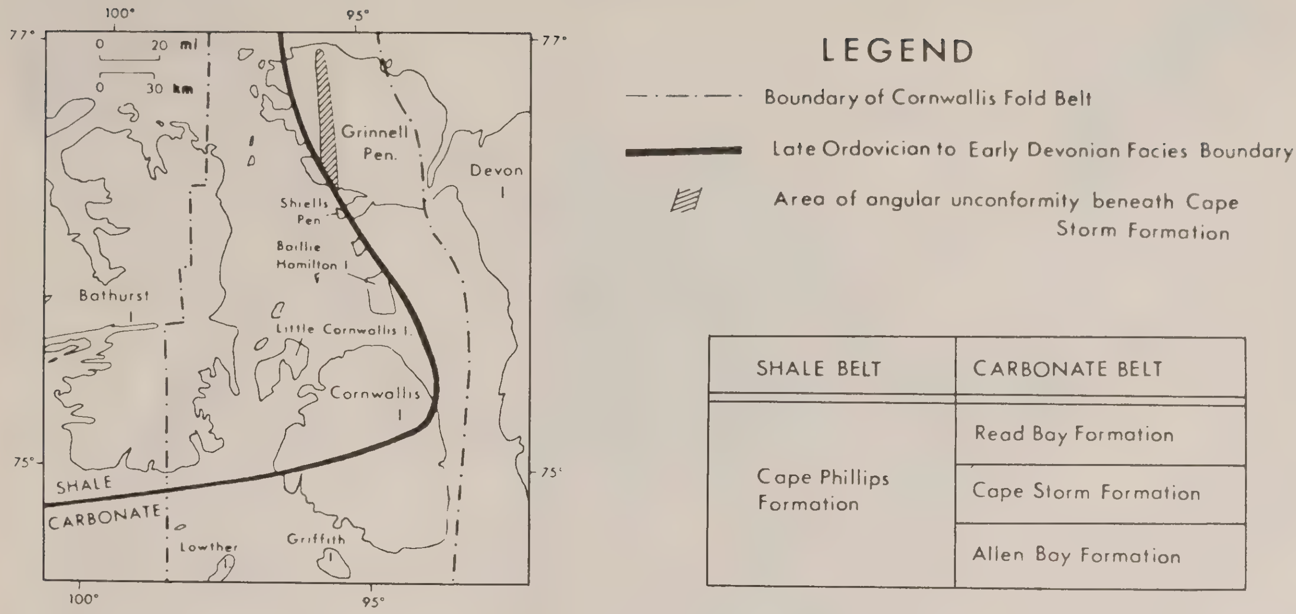


FIGURE III-4: Regional extent of Upper Ordovician to Lower Devonian shale-carbonate facies change. From Kerr (1977a).

HISTORY

The area was part of Prospecting Permit 289 granted in 1973. Reconnaissance mapping and soil sampling led to the discovery of showings and the TERN and LAURA claims were staked in the latter part of the 1975 field season. In 1977 additional mapping and prospecting identified more showings and the CAPE claims were staked. The LAURA claims were allowed to lapse, however Prospecting Permits 505,506 and 507 granted in January, 1978 include the entire area of the Eastern Facies Front.

DESCRIPTION

The TERN and CAPE claims are near the eastern margin of the Cornwallis Fold Belt, which developed in response to repeated movement of the Boothia Uplift (Kerr, 1977a). The area has been mapped by Thorsteinsson (1958) and Thorsteinsson and Kerr (1968).

The claims are near the Eastern Facies Front (Fig. III-3), the eastern portion of a major shale-carbonate facies change (Fig. III-4) that has been eroded in the vicinity of the Centre Anticline. The Eastern Facies Front lies on the eastern limb of the Centre Anticline and dips are generally 15 to 25 degrees to the east. Over 1,000 m of graptolitic petroliferous shales and limestones of the Cape Phillips Formation are characterized by subdued relief and poor outcrop and abut sharply against fairly well exposed carbonates of the Allen Bay, Cape Storm and Read Bay Formations to the south and east. Easterly trending interfaces are characterized by abundant interfingering of shale and carbonate. Northerly trending interfaces are smooth and represent bedding planes (Fig. III-5).

A complete section of the Allen Bay Formation is exposed on the TERN claims, where the Allen Bay Formation is almost completely dolomitized. On the CAPE claims, the lower Read Bay Formation, normally a limestone, is extensively dolomitized, especially near the facies front. Several showings of fracture controlled zinc mineralization and solution collapse structures are present in the area.

CURRENT WORK AND RESULTS

As a part of a continuing study of the Eastern Facies Front, the geology of the TERN claims was remapped, known showings were re-evaluated in terms of their geological setting and geochemical samples were collected along fracture systems that might be related to mineralization. The re-mapping outlined a dolomitized reef complex on the TERN group.

The 1978 work on the CAPE claims included establishing a grid, detailed geological mapping and soil sampling. The Read Bay Formation which underlies the CAPE claims was identified as a reef complex which has been selectively dolomitized.

Reconnaissance mapping and prospecting in the remainder of the permit areas revealed widespread bitumen and incipient to well developed pseudobreccia, but no mineralization.

The permits were relinquished in 1980.

ASTON BAY PROJECT — Uranium
Esso Minerals Limited, — 58 C/5,6,11-13
500 6th Ave. SW, — $73^{\circ}35'$N, 95°W
Calgary, Alberta.

REFERENCES

Dixon (1974); Gregory and others (1961); Jones and Fahrig (1978); Reinsson and others (1976).

PROPERTY

None

FIGURE III-5: Geology-photomap of the Eastern Facies Front.

LOCATION

The area of interest is south of Aston Bay, Northwest Somerset Island, about 110 km south of Resolute Bay.

HISTORY

The Geological Survey of Canada conducted a reconnaissance airborne radiometric survey in the Arctic Archipelago during 1955 (Gregory and others, 1961). Several areas, including northwestern Somerset Island and northeastern Prince of Wales Island, produced high background radioactivity.

In August, 1977, Trigg Woollett and Associates Ltd. examined several locales on northwestern Somerset Island and Prescott Island and discovered areas anomalously radioactive.

DESCRIPTION

South of Aston Bay, Somerset Island, Helikian Aston Formation and Neohelikian or Hadryian Hunting Formation rest unconformably on Aphebian basement rocks of the Churchill Province.

The lower part of the Aston Formation consists largely of well sorted orthoquartzite. There is conglomerate or breccia at the base of the section and three major units of purple and red sandy siltstone near the base, middle and upper parts of the formation. Localized colonies of club-shaped columnar stromatolites occur in the upper and lower siltstone members (Reinsson and others, 1976).

Dixon (1974) divided the Hunting Formation into three units. Member 1 rests conformably upon the Proterozoic Aston Formation and consists of sandstone, sandy dolostone and cherty dolostone; member 2 consists of alternating dolostone and cherty dolostone; and member 3 contains a variety of dolostone types. Depositional environments ranged from supratidal to shallow subtidal and much of the deposition may have been on a tidal flat complex.

Potassium-argon ages of diabase dykes and sills that intrude these two units indicate that the Aston Formation is older than 1,240 m.y. and the Hunting Formation is between 1,240 and 675 m.y. old (Jones and Fahrig, 1978).

CURRENT WORK AND RESULTS

A number of airborne radiometric anomalies were ground checked but none merited additional work.

PROSPECTING PERMITS 476-478 — Uranium
Esso Minerals Limited, — 68 A/8,9,16 & D/1,7
500, 6th Ave. S.W., — 72°45'N, 96°30'W
Calgary, Alberta.

REFERENCES

Christie and others (1971); Gregory and others (1961).

PROPERTY

Prospecting Permit 476	68 A/9 NW
Prospecting Permit 477	68 A/16 SW
Prospecting Permit 478	68 D/1 SW

LOCATION

The area of interest is along the east coast of Prince of Wales Island from Le Feuvre Inlet to Back Bay and includes Pandora and Prescott Islands.

HISTORY

The Geological Survey of Canada conducted a reconnaissance airborne radiometric survey in the Arctic Archipelago during 1955 (Gregory and others, 1961). Several areas, including northwestern Somerset Island and northeastern Prince of Wales Island, showed high radioactive backgrounds.

In August, 1977 Trigg Woollett and Associates Ltd. examined several locales on northwestern Somerset Island and Prescott Island and discovered anomalous radioactivity.

Imperial Oil Ltd. obtained Propsecting Permits 476-478 in January, 1978.

DESCRIPTION

The Aston Formation unconformably overlies basement rocks along the east coast of Prescott, Pandora and Prince of Wales Islands in the Permit Areas (Christie and others, 1971).

CURRENT WORK AND RESULTS

Prospecting and geological mapping located a few thorium anomalies. Stream sediment and/or water analyses did not reveal important uranium values.

The prospecting permits were relinquished at the end of 1978.

KEEWATIN REGION

P.J. Laporte
D.I.A.N.D., Geology Office,
Yellowknife, N.W.T.

In 1978, the District Geologist, Keewatin Region, monitored mineral exploration in the mainland part of the Northwest Territories east of 102°W longitude, and acted as co-ordinator for the Land Resources Section in Baker Lake, N.W.T. The Keewatin Region is part of the Churchill Structural Province of the Canadian Shield. It is underlain by Archean and Aphebian volcanic, sedimentary and plutonic rocks deformed and metamorphosed during the Hudsonian Orogeny. Shallow-dipping to flat-lying unmetamorphosed to slightly metamorphosed rocks of late Aphebian and Helikian age locally overlie the metamorphic complex south and west of Baker Lake (Fig. IV-1).

In this report, the Keewatin District has been subdivided into three main regions on the basis of geology and exploration targets (Fig. IV-1): the Ennadai Lake-Rankin Inlet area, the Baker Lake-Thelon River area and the Chantrey Inlet-Wager Bay area. Most of the properties in the district encompass, or are adjacent to, lakes on which fixed-wing aircraft can land.

CARIBOU PROTECTION MEASURES

In February, 1978, Interdisciplinary Systems Ltd. presented to Indian Affairs and Northern Development a report on the impact of mineral exploration on wildlife in the Baker Lake area. The study, commissioned in 1977 (Laporte, 1981)*, concluded that more data was required on caribou activity and stressed the dependence of Baker Lake residents on caribou. While no major conflict was discerned between exploration activity and wildlife, stricter land-use regulations were recommended for the following areas:

- major river crossings where caribou are very nervous and most susceptible to disturbance;
- calving areas where disturbances can create panic and stampeding, leading to trampling or abandonment of calves by mothers;
- post-calving migration areas where mothers and calves are in large aggregations and consequently very susceptible to disturbances.

Low-flying aircraft were described as a major disturbing influence on caribou aggregations.

Not satisfied with these recommendations, the residents of Baker Lake petitioned the Minister for an extension of the March 30, 1977 moratorium on the issuance of prospecting and land-use permits and recording of claims. Orders in Council extended the moratorium until April 14, 1978 and subsequently to April 25, 1978. The latter extension was invoked to allow time for courts to consider an application from Inuit Tapirisat of Canada, the Baker Lake Hunters and Trappers Association and Baker Lake residents for an injunction to halt development activities in the Baker Lake study area until the land claims were settled. The court issued an interim injunction on April 24, 1978 which prohibited the issuance of mining leases at caribou crossing sites or in calving and post-calving areas as defined in the study. The Department was also forbidden to issue land-use permits allowing mineral exploration:

- within three miles (4.8 km) of caribou crossing sites at any time of the year;
- within calving areas between May 15 and June 30;
- within post-calving areas between July 1 and 31.

After discussion with the Fish and Wildlife Service of the Government of the Northwest Territories, the Land Resources Section defined the borders of the calving and post-calving areas outside the Baker Lake study area (Fig. IV-2). Land-use permits issued for these areas included the time restrictions specified in the injunction.

ENNADAI LAKE-RANKIN INLET AREA

In this area a complex of granitic gneisses, migmatites and intrusions enclose northeast-trending belts of Archean volcanic flows and pyroclastics, slate, greywacke, conglomerate and minor iron formation. These Archean rocks are unconformably overlain by Aphebian conglomerate, greywacke, quartzite, orthoquartzite, argillite and dolomite which, to the east, are interbedded with and overlain by basaltic flows. During the Hudsonian Orogeny, the Aphebian and Archean rocks were folded about northeasterly axes and intruded by quartz monzonite and granodiorite. Fluorite-bearing granite intruded the Archean-Aphebian complex during the Paleohelikian.

Volcanogenic massive sulphide and precious metal deposits within the Archean volcano-sedimentary assemblage are the main targets of mineral exploration in this area. The uranium potential of the Aphebian sediments and granitic intrusives is also being studied.

MAGUSE LAKE-WALLACE RIVER PROJECT	Base Metals
Aquitaine Company of Canada Ltd.,	55D,E,F; 65H
2000, 540 Fifth Avenue S.W.,	
Calgary, Alberta.	
T2P 0M4	

REFERENCES
Davidson (1970); Laporte (1981)*; Wright (1967).

PROPERTY
The claim groups held by Aquitaine Company of Canada in the southeast part of the Keewatin District are listed in Figure IV-3.

LOCATION
The project area extends west from the shore of Hudson Bay to Ray and Carr Lakes.

HISTORY
The 57 claim groups listed in Figure IV-3 were acquired between 1973 and 1977 (Laporte, 1981)*. The 13 ACO (55-69), 11 ACO (89-100), ACO 169 and 170, JOE 1-12, MAG 1-4 and WEY 5 and 6 claims lapsed in 1979.

DESCRIPTION
The Maguse Lake-Wallace River Project is a study of the base metal potential of the southeastern part of the Rankin-Ennadai greenstone belt. Metamorphosed, pillowed and massive dacitic to basaltic

* *All references to Laporte (1981) should read Laporte (1982)*

FIGURE IV-1: Geology map of the Keewatin Region showing subdivisions:
1) Ennadai Lake-Rankin Inlet area 3) Chantrey Inlet-Wager Bay area
2) Baker Lake-Thelon River area

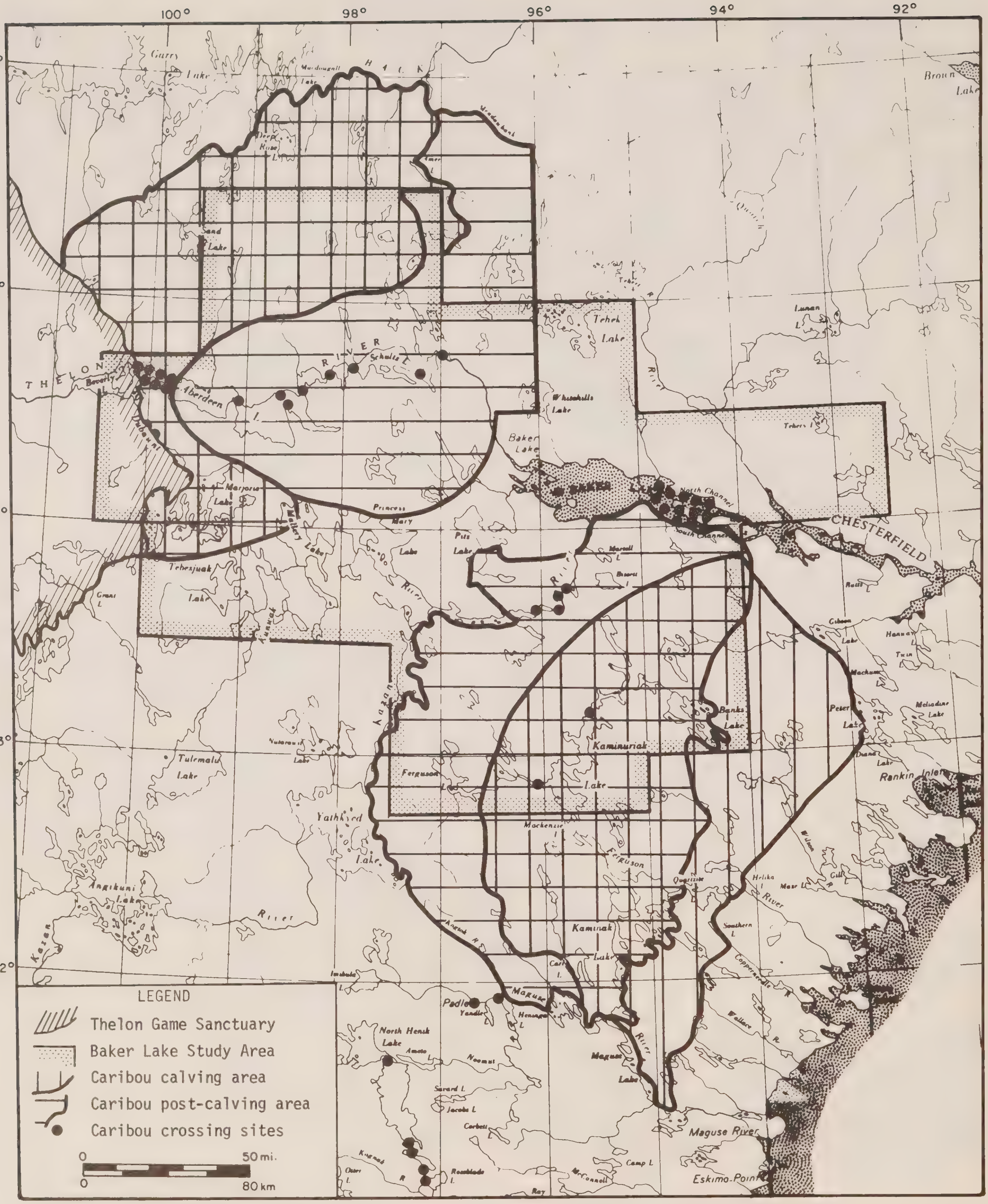


FIGURE IV-2: Map of the central Keewatin District showing areas affected by Caribou Protection Measures.

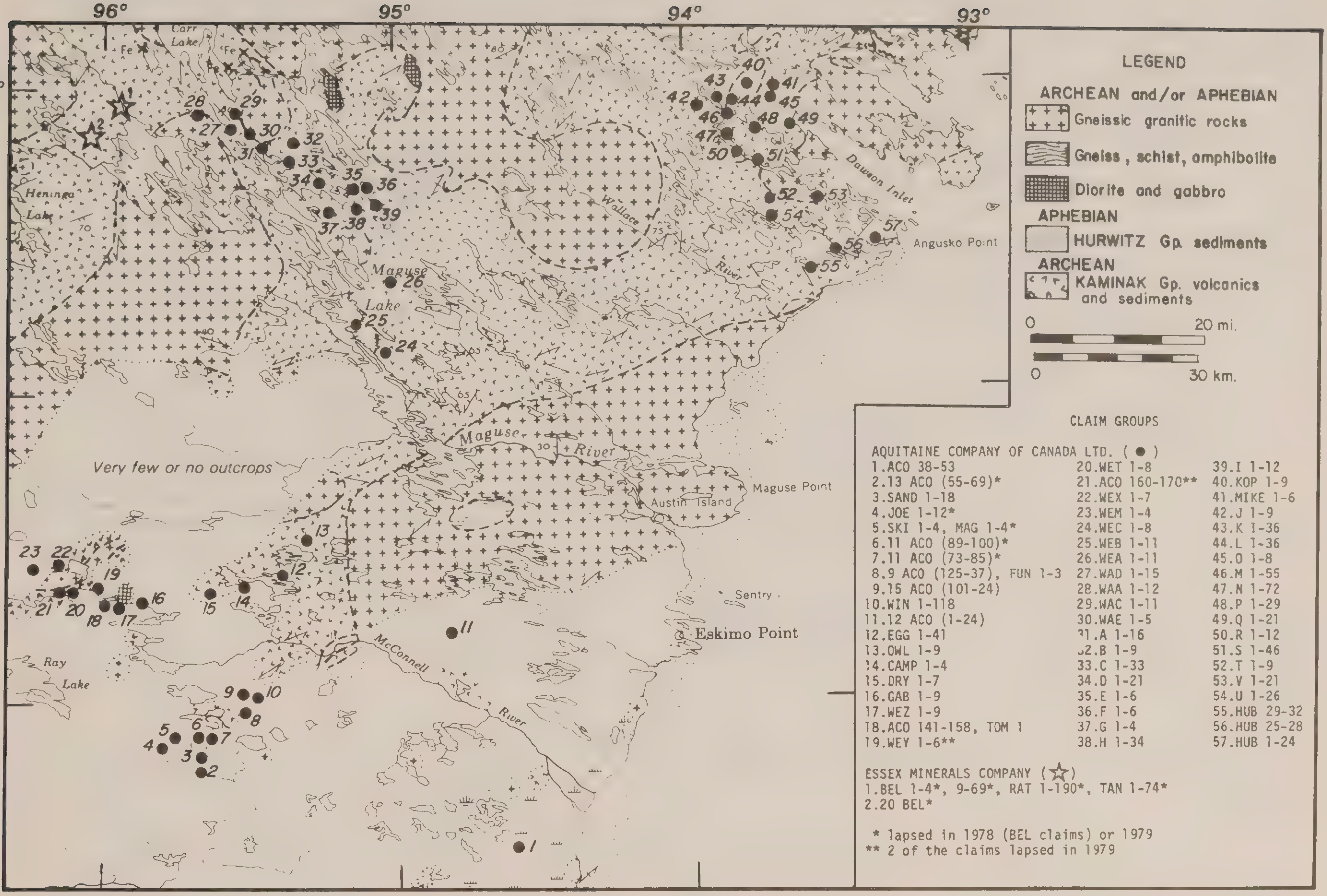


FIGURE IV-3: Geology of the Maguse Lake-Wallace River area and location of Aquitaine Company of Canada Ltd. and Essex Minerals Company properties (geology from Wright, 1967).

volcanic rocks, quartzite, shale, greywacke and magnetite iron formation of the Archean Kaminak Group underlie the project area. Granitoid plutons intrude the supracrustals to the west, north and southeast (Fig. IV-3).

CURRENT WORK AND RESULTS

Six holes, totalling approximately 750 m, were drilled east of Ray Lake.

KEEWATIN PROJECT — Gold
Essex Minerals Company, — 55 E/13, 65 H/16
1208, 7 King Street E., — 61°58'N, 95°56'W
Toronto, Ontario,
M5C 1A2

REFERENCES

Bell (1971); Davidson (1970); Laporte (1981).

PROPERTY

The BEL, TAN and RAT claims are held by Essex Minerals Company for the Keewatin Joint Venture which also involves Penarroya Canada Ltee, Aquitaine Company of Canada Ltd., Rexomines Ltd. and Serem Ltee.

LOCATION

The BEL, RAT and TAN claims cover the northwest corner of Turquetil Lake and extend across the mouth of an unnamed northwest-trending river (Fig. IV-3).

HISTORY

Giant Yellowknife Mines Ltd. held the Turquetil Lake area as Prospecting Permit 9 in 1961 and 1962. Four holes, totalling 86.6 m, were drilled on a gold showing in 1961.

Penarroya Canada Ltd. acquired the BEL 1-233 claims in January, 1970 and let 148 of them lapse in 1971. The remainder lapsed in 1978. The RAT 1-190 and TAN 1-74 claims were staked for U.S. Steel (now Essex Minerals Co.) in June, 1975 and lapsed in 1979.

DESCRIPTION

The BEL and TAN claims are underlain by mafic to felsic volcanic rocks enclosing, east of the river, a narrow belt of metasediments. Giant Yellowknife Mines Ltd. geologists describe the gold showing as "pod-like bodies of quartz and carbonate stockwork containing erratically distributed arsenopyrite stringers localized in sheared pyrite-bearing chloritic phyllites and schists". The sulphides are in scattered outcrops over a 215 m length of an extensive but irregular northeast-trending zone of shearing and alteration. Grab samples from the surface showings contained 4.83, 63.44 and 155.16 ppm Au but the core contained a maximum of 7 ppm Au over 0.61 m.

CURRENT WORK AND RESULTS

Six holes were drilled but no economic concentrations of gold were outlined.

LEGEND

APHEBIAN

g. Granite, quartz monzonite, granodiorite

HURWITZ GROUP: quartzite, orthoquartzite, phyllite, quartz-mica-feldspar schist, knotted schist, calc-silicate rock, crystalline limestone, meta-gabbro sills, derived schist and gneiss

ARCHEAN

q. Quartz monzonite to granite, minor granodiorite; massive to foliated

gn. Granodiorite gneiss, banded gneiss

p. Paragneiss, some paraschist

..... Limit of 1:250,000 mapping

PROPERTIES

1. Prospecting Permit 520
2. Q 1-40
3. ARC 19-28
4. Q 81-100
5. ARC 4-9
6. ARC 1-3
7. ARC 13-18
8. ARC 10-12

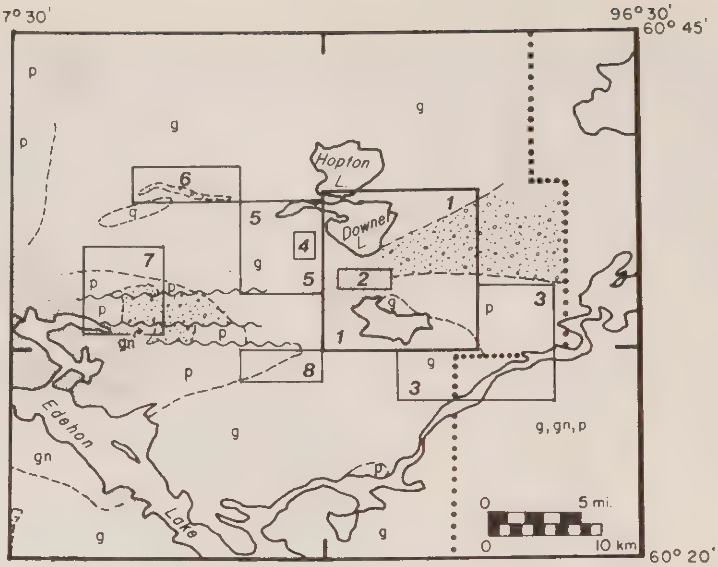


FIGURE IV-4: Geology of the Downer Lake area and location of the E. & B. Explorations Ltd. properties (geology from Eade, 1973).

DOWNER LAKE PROJECT
E. & B. Explorations Ltd.,
300 Fifth Avenue S.W.,
Calgary, Alberta,
T2P 3C4

Uranium
65 A/6,7,10,11
60°33'N, 97°00'W

REFERENCES

Eade (1973); Hornbrook and others (1977a).

PROPERTY

The properties are listed in Figure IV-4.

LOCATION

The prospecting permit and claims are southeast and west of Downer Lake (Fig. IV-4).

HISTORY

Taiga Consultants Ltd. staked the Q claims in July, 1977 to cover lake sediment geochemical anomalies (Hornbrook and others, 1977a). E. & B. Explorations acquired Prospecting Permit 520 in early 1978 and the ARC 1-28 claims in September, 1978.

DESCRIPTION

The area southeast of Downer Lake is underlain by metasediments and paragneiss derived from Aphebian Hurwitz Group sediments and Archean metavolcanics and metasediments. Granite and quartz monzonite of Aphebian age outcrop north and south of the paragneiss.

CURRENT WORK AND RESULTS

An airborne survey provided 1,033 line-km of radiometric, magnetic and VLF-EM data along lines 400 m apart. A four-man crew spent two months mapping, prospecting and surveying, with scintillometers, the anomalies detected. Geochemical surveys included the analysis of soil samples for radon and of 249 lake sediment samples for uranium.

Radioactive granite and granitic gneiss boulders containing up to 0.366% U_3O_8 were discovered. The uranium/thorium ratio of the gneiss is approximately 1:1. The VLF-EM conductors detected correspond to valleys.

Q CLAIMS PROJECT
E. & B. Explorations Ltd.,
300 Fifth Avenue S.W.,
Calgary, Alberta,
T2P 3C4

Uranium
65 B/4, C/5,9

REFERENCES

Eade (1971, 1973); Hornbrook and others (1977b, c).

PROPERTY

Q 101-160	65 B/4	(60°13'N, 99°38'W)
Q 41- 80	65 C/5	(60°22'N, 101°55'W)
Q 161-200	65 C/9	(60°34'N, 100°05'W)

LOCATION

The Q 101-160 claims cover part of a large peninsula in Nueltin Lake southwest of the mouth of Hearne Bay. Claims Q 41-80 are centered 3 km east of the northeast shore of Kasba Lake and 9 km west of the north end of Gale Lake. The Q 161-200 claims are in two groups south of Windy River. One group covers the north end of Windy Lake and the other is 5 km east of the outlet of the lake.

HISTORY

The claims were staked by Taiga Consultants Ltd. in July, 1977 to cover geochemical anomalies outlined during a lake sediment survey (Hornbrook and others, 1977b, c).

DESCRIPTION

A contact between Archean paragneiss, to the east, and white to grey Aphebian granodiorite trends north across the Q 101-160 claims. The Q 41-80 and Q 161-200 claims cover the contact between arkose and subgreywacke of the Aphebian Hurwitz Group and Nueltin Lake granite intrusions.

CURRENT WORK AND RESULTS

A crew from G.A. Noel & Associates Inc. prospected and mapped the claims, and measured radon in soil. Nueltin Lake granite outcrops are radioactive but the thorium to uranium ratio is approximately 12:1.

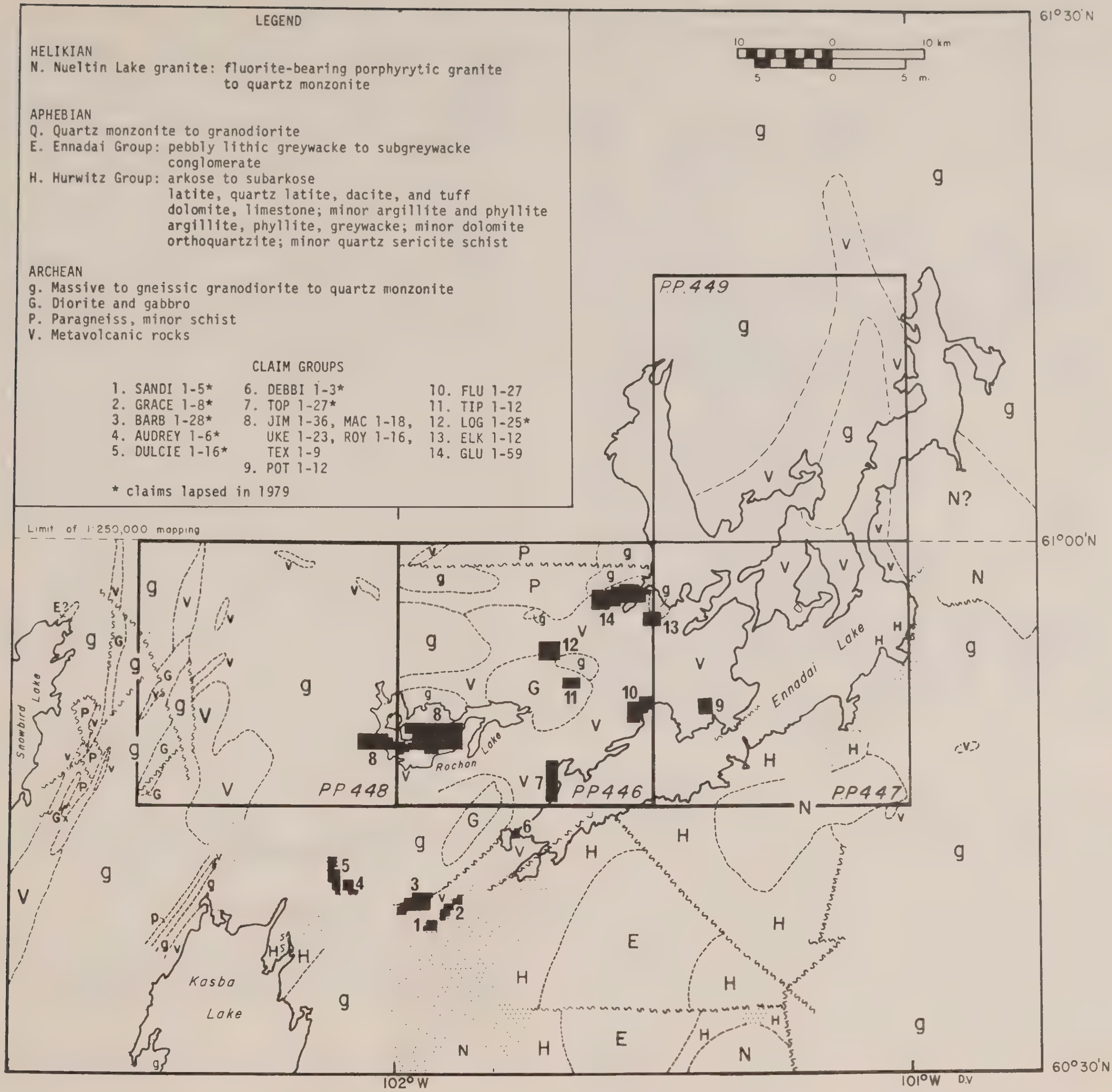


FIGURE IV-5: Geology of the Ennadai Lake area and location of the Gulf Minerals Canada Ltd. Properties (geology from Eade, 1971; Taylor, 1963 and Wright, 1967).

ENNADAI LAKE PROJECT
Gulf Minerals Canada Ltd.,
1400, 110 Yonge Street,
Toronto, Ontario,
M5C 1T4

Base Metals
65 C/12,13,14;
D/8,9; F/3
61°00'N, 101°45'W

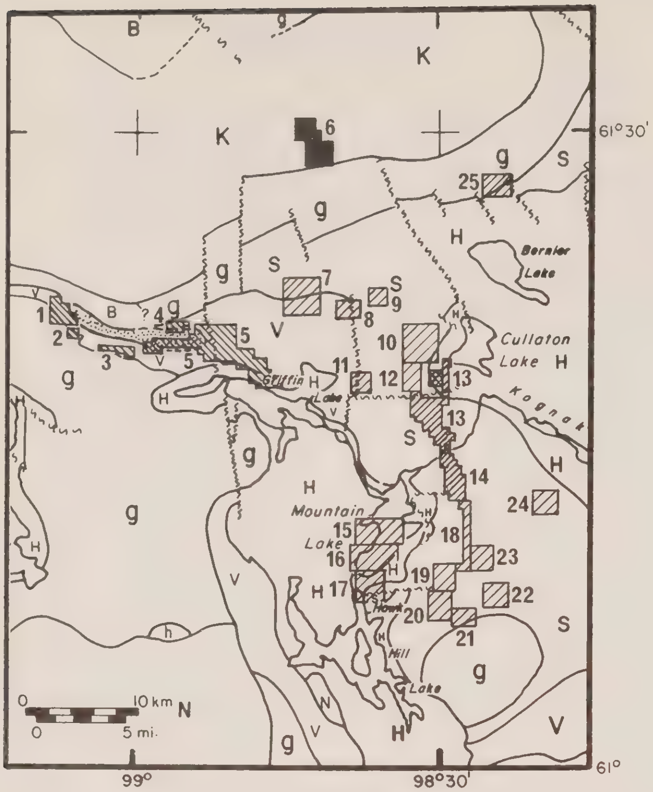
REFERENCES
Eade (1971); Laporte (1981); Taylor (1963); Wright (1967).

PROPERTY
The four prospecting permits and 14 claim groups explored are listed in Figure IV-5.

LOCATION
The prospecting permits and claim groups are north and west of Ennadai lake (Fig. IV-5).

HISTORY
Gulf Minerals Canada Ltd. acquired the claims on Rochon Lake from Phelps Dodge Corporation of Canada Ltd. in 1976. The ELK, GLU, LOG, POT, TEX, TIP and TOP claims were staked in 1976. The other claims and Prospecting Permits were acquired in 1977 (Laporte, 1981).

DESCRIPTION
A 5- to 19-km wide belt of Archean metavolcanic rocks trends northeast along the north shore of Ennadai Lake. Smaller belts of volcanics trend north and east in the western and northern parts of Prospecting Permit 448. These belts of supracrustals are intruded by granitic and gabbroic bodies and grade, to the northeast, into paragneiss and paraschist.



LEGEND

HELIKIAN
N. Nueltin Lake granite

APHEBIAN
K. Krekot Lake monzonite to granite
B. Bate Lake Sediments:
phyllite and dolomite
metamorphosed arkose to subgreywacke to siltstone
H. Hurwitz Group:
gabbro sills
impure quartzite, arkose, quartz-sericite schist
greywacke
dolomite, argillite, siltstone
slate, shale, siltstone
orthoquartzite
conglomerate, greywacke conglomerate

ARCHEAN
g. Massive to gneissic granodiorite
h. Hornblende-chlorite-feldspar schist
Henik Group:
s. Greywacke, argillite, phyllite; tuff; minor conglomerate, quartzite, iron-formation, dolomite
v. Mafic to felsic volcanic rocks, includes some tephra
Ultramafic flows

CLAIM GROUPS

Noranda Exploration Company Ltd.
1. FIVER 1-16
2. BULK 1-4*
3. GOR 1-9*
4. CEDAR 1-7*
5. ROY 1-37, STRIDER 1-74

Denison Mines Ltd.
6. BATE 1-5*, BYE, FLY, RICH 1-16

O'Brien Energy and Resources Ltd.
7. DOUG
8. CHAS
9. PAGE
10. COD
11. GEORGE
12. BO
13. AIR 1-12, DWE 1-17
GILT 1-15, 17-22, 25-29
14. PEN 3-31
15. KELLY
16. BETH
17. JANET
18. JOHN, KAREN, MARIE, MICK, RITA
19. NOBE
20. RON
21. SHAW
22. LYNNE
23. JUDY
24. SUN
25. MORT

Royex Sturgex Mining Ltd.
13. MIK 3-5, 11-13

* lapsed in 1979

FIGURE IV-6: Geology of the Cullaton Lake area and location of properties (geology from Eade, 1974 and Eade and Chandler, 1975).

Aphebian arkose to subarkose, intruded by Nueltin Lake porphyritic granite, outcrop on the southeast corner of Prospecting Permit 447 on the south shore of Ennadai Lake.

CURRENT WORK AND RESULTS

Prospecting Permit 448 was mapped at a reconnaissance scale, 10 grids covering geophysical anomalies, detected during the 1976 and 1977 airborne surveys, were surveyed with EM and magnetometer, and 13 conductors were probed by 35 holes totalling 3,616 m. Holes were drilled in the east central part of Prospecting Permit 448 (3 holes), on Prospecting Permit 446 west of the LOG claims (8 holes) and south of Rochon Lake (2 holes), and on the FLU (1 hole), POT (1 hole), DEBBI (1 hole), GRACE (1 hole), BARB (7 holes), AUDREY (3 holes) and DULCIE (8 holes) claims. Minor concentrations of copper and zinc were encountered, often in association with graphitic zones, in mafic to felsic volcanic flows and tephra.

CULLATON LAKE PROJECT — Gold
O'Brien Energy & Resources Ltd., — 65 G/1,2,7,8
916, 111 Richmond Street,
Toronto, Ontario,
M5H 2G4

REFERENCE

Eade (1974).

PROPERTY

The claims staked by T. Skimming and Associates Ltd. for O'Brien Energy & Resources Ltd. are listed in Figure IV-6.

LOCATION

The new claims are near the B-Zone Gold Deposit north and west of Cullaton Lake and south and east of Mountain Lake (Fig. IV-6).

HISTORY

An EM and magnetometer survey flown in 1977 outlined anomalies which were staked in the summer of 1978.

DESCRIPTION

The areas staked are underlain by greywacke, argillite, phyllite and tuff of the Archean Henik Group (Eade, 1974). Magnetic anomalies on the claims reflect the presence of iron-formation in the sediments.

CURRENT WORK AND RESULTS

Magnetometer surveys were done on the claims in 1978.

B-ZONE GOLD DEPOSIT — Gold
O'Brien Energy & Resources Ltd., — 65 G/1,7,8
916, 111 Richmond Street, — 61°17'N, 98°31'W
Toronto, Ontario,
M5H 2G4

REFERENCES

Eade (1974); Laporte (1981).

PROPERTY

The claims covering the B-Zone Gold Deposit and its extensions are listed in Figure IV-6.

LOCATION

The claims cover a 2- to 4-km wide area extending 15 km south from the southeast end of Cullaton Lake (Fig. IV-6).

HISTORY

The B-Zone Gold Deposit was discovered and drilled by Selco Exploration Co. Ltd. in 1962 and restaked as GILT claims in 1972. The PEN claims were added to the property in late 1973 and the AIR 1-12 and DWE 1-13 in 1974. The PEN 32-35 lapsed and DWE 14-17 were staked in early 1975. A 106 m long decline was driven into the deposit in 1975.

DESCRIPTION

The claims cover magnetite-siderite-chert-sulphide iron formation in greywackes and felsic to intermediate pyroclastics. The B-Zone deposit is a 152-m segment of a discontinuous iron formation that has been traced for 1,524 m. The iron formation is deformed, broken and recemented by quartz, carbonate and sulphides. Gold is closely associated with the sulphides but not all sulphides carry gold. Drilling in the 1960's and in 1973 outlined 167,830 tonnes grading 24 ppm Au after dilution.

CURRENT WORK AND RESULTS

In 1978 a small crew refurbished the camp, dewatered the adit and maintained the airstrip and roads.

BATE LAKE GROUP	Uranium
Denison Mines Ltd.,	65 G/7,10
Box 40, Royal Bank Plaza,	61°30'N, 98°45'W
Toronto, Ontario,	
M5J 2K2	

REFERENCES

Eade (1974); Laporte (1981).

PROPERTY

BATE 1-5, 1 BYE, 1 FLY, RICH 1-16

LOCATION

The claims are 4 km east of a triangular lake midway between Bate and Griffin Lakes (Fig. IV-6).

HISTORY

The RICH claims were staked in 1976 and the BATE claims in 1977. Mapping, prospecting and scintillometer surveys were used to explore the claims in 1977 (Laporte, 1981). The BYE and FLY claims were recorded in September, 1978 and the BATE claims lapsed in 1979.

DESCRIPTION

Aphebian granitic intrusions underlie the claims.

CURRENT WORK AND RESULTS

A crew from W.G. Wahl Ltd. prospected the area in 1978.

BAKER LAKE-THELON RIVER AREA

The Baker Lake-Thelon River area is underlain by a complex of gneisses and gneissic to massive granitic intrusions enclosing Archean volcanics to the south and Aphebian metasediments, with minor volcanic flows, to the northwest. Late Aphebian to early Helikian shallow-dipping conglomerates and arkosic sandstone and mudstone intruded by syenitic bodies and overlain by intermediate to felsic volcanic flows and pyroclastics cover the basement complex south and southwest of Baker Lake. Flat lying quartzose conglomerates and sandstones of Paleohelikian age overlie the basement complex in the Thelon River area west of Baker Lake.

Exploration in this area is for uranium in the basement complex, Aphebian sediments of the Hurwitz and Amer Groups and late Aphebian to early Helikian Dubawnt Group sediments and volcanics.

LGT'75 PROJECT	Uranium
Pan Ocean Oil Ltd.,	65 J/5 to 12, 14
300 Fifth Avenue S.W.,	62°37'N, 99°15'W
Calgary, Alberta	
T2P 2M7	

REFERENCES

Blake (1980); Eade (1976); Eade and Blake (1977); Laporte (1981).

PROPERTY

Four prospecting permits and 22 claims groups are listed in Figure IV-7.

LOCATION

The project covered the area bordered by Yathkyed Lake to the east, Angikuni Lake to the southwest and Tulemalu Lake to the northwest.

HISTORY

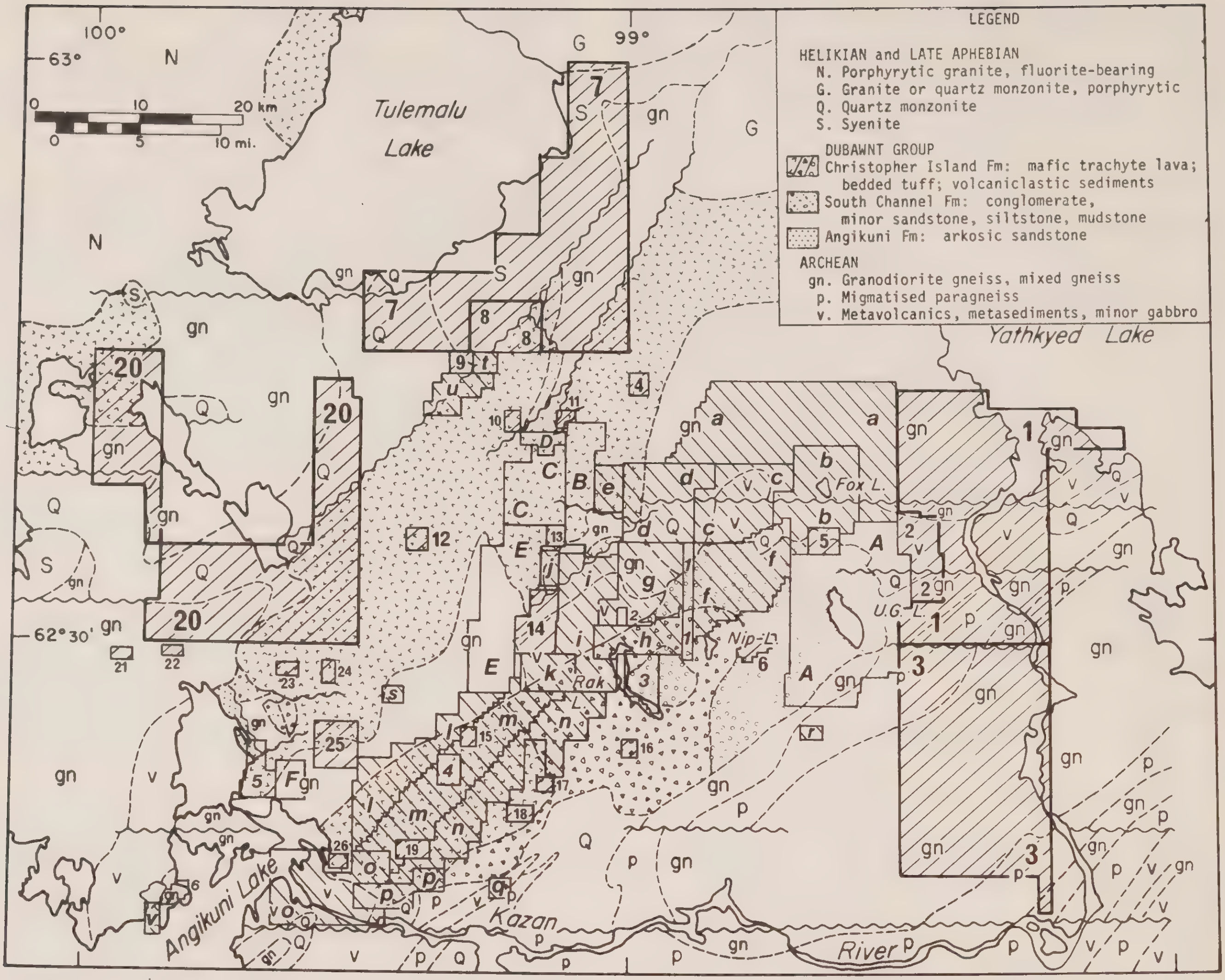
The YU 1-161 claims were staked in August and September 1975 and Prospecting Permits 365 to 368 were acquired in early 1976. Sixteen claim groups were staked in 1976 and the YU 801 to 825 claims were acquired in October 1977. The NU 1-4 and 15-17 claims cover parts of the prospecting permits which expired in 1979.

DESCRIPTION

Prospecting Permits 365 and 366, west of Yathkyed Lake, cover granitoid gneisses enclosing an east-trending belt of Archean metavolcanics and northeast-trending belts of migmatized paragneiss. Prospecting Permit 367 is underlain by granitoid gneiss and, in the southeast and northwest corners, volcanics of the Dubawnt Group. Prospecting Permit 368 is underlain by an 8- to 16-km wide and 32-km long intrusion of hornblende syenite in granitoid gneiss overlain to the east and south by Dubawnt Group volcanics and sediments. The claim groups cover parts of the two northeast-trending belts of Dubawnt Group sediments and volcanics and parts of the granitic gneiss basement complex.

CURRENT WORK AND RESULTS

Prospecting Permits 366 and 368 were explored with a 727-sample lake water and sediment survey and prospecting of part of the eastern permit. A grid on the western part of the YU 801-825 claims was explored with geological mapping, prospecting and magnetometer and scintillometer surveys. Radioactivity on the grid is in a series of northeast-trending shear zones in magnetic hornblende syenite, samples of which contain as much as 1005 ppm U and 9591 ppm Th. The YU 1-36 were also explored; a magnetometer survey, sedimentological and structural studies and 21 Winkie drill holes totalling 208 m attempted to determine the controls on the emplacement of and extent of a uranium showing in Dubawnt Group basal conglomerate. The best assay of core samples was 644 ppm U over 0.9 m.



Noranda Exploration Company Ltd.

- **a.** DOG 1-854*
- **b.** 97 FOG, REV 1-108, TEW 1-71
- **c.** MUR 1-36, 82 SNO, WET 1-112, ZAK 1-24
- **d.** BOG 1-280
- **e.** WIT 1-60
- **f.** 355 NIP
- **g.** 46 ICE, OG 1-56, YAT 1-32, YAT 34-110, 57 YED
- **h.** 103 SOG, VER 1-35
- **i.** FST 58-232, 234-239
- **j.** NEST 1-32
- **k.** RIB 1-96
- **l.** ERM 2-6, 8, 9
- **m.** BIR 1-28, HED 1-16, MOLSON 1-333
- **n.** VIV 1-10, 12, 13
- **o.** SUE 1-331*
- **p.** GOS 1-35*, KAZ 1-30*, PIN 1-35*
- **q.** DUG 1-16
- **r.** SUN 1-15*
- **s.** GIO MAR 1-16
- **t.** KOL 1-25
- **u.** VANG 1-85*
- **v.** AN 1-21

Pan Ocean Oil Ltd.

- **1.** Prosp. Perm. 366*
- **2.** NU 1-4
- **3.** Prosp. Perm. 365*
- **4.** YU 578-93
- **5.** YU 1-36
- **6.** YU 37-61
- **7.** Prosp. Perm. 368*
- **8.** NU 15-17
- **9.** YU 801-25
- **10.** 12 YU
- **11.** YU 546-60
- **12.** BCZ 75-99
- **13.** YU 562-77
- **14.** 108 YME
- **15.** YU 219-34
- **16.** YU 600-15
- **17.** YME 1-16
- **18.** YU 301-24
- **19.** YU 325-52
- **20.** Prosp. Perm. 367*
- **21.** YU 501-15
- **22.** YU 516-30
- **23.** YU 531-45
- **24.** YU 235-49
- **25.** YU 62-161
- **26.** YU 174-85

Urangesellschaft Canada Ltd.

- **A.** A 1-36, B 1-36, 46 BH, BJ 1-12, C 1-36, COW 1-20, CUR 1-18, D 1-36, E 1-36, F 1-36, G 1-36, GEB 1-8, 18 GG, H 1-36, I 2-37, J 1-36, K 1-36, L 1-39, M 1-36, MIT 1, N 1-36, O 1-8, P 1-37, Q 1-36, R 1-36, REY 1-10, WIE 1-19
- **B.** BIL 1-21, BUG 1-28, 36 CRO, CW 1-20, FAR 1-10, GEO 1-28, GER 1-19, GU 1-28, LAU 1-15, ROD 1-28, ROL 1-21, TB 1-12, UG 1-21, VAN 1-21
- **C.** UHF 1-5

Shell Resources Canada Ltd.

- **D.** ALC 1-19*, ALD 1-17

Comaplex Resources International Ltd.

- **E.** ANGI 1-8, NORM 1
- **F.** OLIV 1

Essex Minerals Company

- **1.** TUL 1-31, 44-61
- **2.** TUL 266-73
- **3.** LAK 1-102
- **4.** ORK 1-42
- **5.** KAZ 1-33, ZAK 1-15*
- **6.** ANG 1-20

* in part lapsed in 1979

FIGURE IV-7: Geology of the Yathkyed-Tulemalu Lakes area and location of properties (geology from Blake, 1980; Eade, 1976 and Eade and Blake, 1977).

YATHKYED PROJECT | Uranium
Noranda Exploration Company Ltd., | 65 J/5,6,7,10,11
P.O. Box 1619,
Yellowknife, N.W.T.
X1A 2P2

REFERENCES

Blake (1980); Eade (1976); Eade and Blake (1977); Laporte (1981).

PROPERTY

The claims held by Noranda Exploration Company Limited and Agip Canada Ltd. are listed in Figure IV-7.

LOCATION

Most of the claims are part of a large group extending southwest from west of Yathkyed lake to Angikuni Lake. Other claims are south, west and northwest of the main group (Fig. IV-7).

HISTORY

The 681 NIP were acquired in late 1975 after a radiometric, magnetic and VLF-EM survey flown by Kenting Earth Sciences Ltd. Prospecting of the 1975 anomalies and ones detected during a second survey flown in 1976 resulted in the discovery of new uranium showings and the staking of 2,668 claims. The 865 BIR, DUG, GIO, MOR, HED, KOL, MOLSON, SUE, SUN, and VANG claims were acquired in 1977. The ERM and VIV claims were acquired and 325 NIP were allowed to lapse in 1978.

DESCRIPTIONS

The main group of claims cover the northeastern, central and southern parts of a basin of Dubawnt Group sediments and volcanics and parts of the adjacent basement complex. Other claims cover parts of a second Dubawnt Group basin to the north, and outcrops of migmatised paragneiss and metavolcanics of the basement complex (Fig. IV-7). Uranium concentrations occur in quartz-feldspar mylonite, shear zones in Archean metavolcanics, syenite dykes and Dubawnt Group volcanics and sediments (Laporte, 1981).

CURRENT WORK AND RESULTS

Twenty-two holes, totalling 1,636 m, were drilled in 1978, 20 on the RIB claims and 2 on the NIP claims. The drilling on the RIB claims tested conductors detected during the 1977 airborne surveys (Laporte, 1981). Two of the holes, 400 m apart, intersected 9.3 m of 0.186% U_3O_8, 2.6 m of which contained 0.521% U_3O_8; and 19.8 m of 0.075% U_3O_8, 0.7 m of which contained 1.61% U_3O_8. During follow-up drilling to test the continuity of these intersections, 11 of 18 holes intersected uranium concentrations but the uranium content and length of mineralized core were considerably less. The uranium occurs as sooty pitchblende and/or uraninite in massive to brecciated, oxidized and silicified Archean felsic mylonite and schist. Trace amounts of chalcopyrite, pyrite, gold, silver and galena are present. The uranium is believed to be epigenetic and related to late alkali volcanism in the area. Laboratory work completed by A.R. Miller of the Geological Survey of Canada indicated the temperature of uranium formation is 100° to 140° under low pressure conditions.

Only minor uranium and copper concentrations were detected in the two holes probing the Dubawnt Group pyroclastics on the NIP claims. Extensions of the surface showing were not intersected.

ANGI AND NORM CLAIMS | Uranium
Comaplex Resources International Ltd. | 65 J/6,11
901, 1015 Fourth St., S.W. | $62^{\circ}33'N$, $99^{\circ}14'W$
Calgary, Alberta,
T2R 1J4

REFERENCES

Blake (1980); Eade and Blake (1977).

PROPERTY

The claims are listed in Figure IV-7.

LOCATION

The ANGI and NORM claims are north of the northeast arm of Angikuni Lake (Fig. IV-7).

HISTORY

Wollex Exploration Ltd. staked the claims in July and August, 1978.

DESCRIPTION

North of Angikuni Lake, a northest-trending belt of Dubawnt Group volcanics and sediments unconformably overlies the gneissic basement complex. On the claims, the volcanics and sediments are in fault contact with the basement (Fig. IV-7).

CURRENT WORK AND RESULTS

A crew from Wollex Exploration Ltd. explored the claims and adjacent areas with lake bottom and lake water geochemical surveys (one sample per 1.5 km), spectrometer surveys flown at 200 m intervals over the northwest half of the property and prospecting.

A 5- by 1-km grid was established over a large magnetic low and geochemical anomaly, mapped at 1:2,500 and surveyed with VLF-EM.

Two uranium concentration were detected. The Norm showing consists of a 43-m long and up to 1.5-m wide fracture in Christopher Island volcanics. The Close showing is a 40-m long fracture in graniodorite.

PROJECT K-17, YATHKYED LAKE | Uranium
Urangesellschaft Canada Ltd., | 65 J/7,10,11
3100, 2 Bloor Street E.,
Toronto, Ontario,
M4W 1A8

REFERENCES

Blake (1980); Eade (1976); Eade and Blake (1977); Laporte (1981).

PROPERTY

The numerous claims explored are listed in Figure IV-7.

LOCATION

The claims are in two groups. The Eastern Block is centered on UG Lake and the Western Block is 29 km to the west-northwest (Fig. IV-7).

HISTORY

In 1975, Urangesellschaft Canada Ltd. acquired 624 A to R claims. The 48 BH and 242 of the Western Block claims were staked in 1976. In 1977, the 172 BJ, COW, CUR, CW, GEB, GER, GG, LAU, MIT, REY and TB were added to the property. The UHF claims were staked in 1978.

DESCRIPTION

The Eastern Block covers an east-trending and south-dipping belt of Archean mafic metavolcanics

enclosing gabbro sills and dykes and minor intermediate to felsic pyroclastics. These rocks are in contact, to the south, with foliated granite which encloses northeast-trending paragneiss. This basement assemblage is unconformably overlain to the west by Helikian clastic sediments and trachytic flows and pyroclastics of the Dubawnt Group.

The Western Block is underlain by granitic gneiss and, to the north, by clastic and volcanic rocks of the Dubawnt Group.

In both claim groups the Helikian/Archean-Aphebian unconformity is marked by angular fragments of basement within a red silty mud matrix.

CURRENT WORK AND RESULTS

The western parts of the Eastern Block and the central part of the Western Block were mapped and prospected at 1:15,000 scale. The northern part of the Western Block was also prospected. Detailed geophysical surveys, including VLF-EM, magnetometer and IP, and soil geochemical surveys were done on grids. Eleven Winkie drill holes, totalling 262 m, and 29 BQ holes, totalling 3,117 m, were drilled on uranium occurrences. An 86-site lake water and sediment geochemical survey was done on the UHF claims.

PROSPECTING PERMITS 498 TO 504 — Uranium
Cominco Ltd. — 65 J/13, K/9,16
1700, 120 Adelaide Street W., — 62°42'N, 100°07'W
Toronto, Ontario,
M5H 1T1

REFERENCES

Tella and Eade (1980); Wright (1967).

PROPERTY

The seven prospecting permits held by Cominco Ltd. are listed in Figure IV-8.

LOCATION

Prospecting Permits 498 to 504 are southwest of Tulemalu Lake (Fig. IV-8).

HISTORY

The prospecting permits acquired by Cominco Ltd. in 1978 cover ground never before held as prospecting permits. Prospecting Permits 498 to 501 were relinquished in 1979.

DESCRIPTION

An east-trending lobe of the belt of Dubawnt Group volcanic flows which trends from Dubawnt Lake to south of Kamilukuak Lake outcrops on the prospecting permits. The flows unconformably overlie a basement complex of granitic gneisses and migmatites.

CURRENT WORK AND RESULTS

A small crew explored the permits with airborne radiometric surveys, geological mapping and prospecting. No significant uranium concentrations were detected.

BUGS PROJECT — Uranium
Cominco Ltd. — 65 K/3,4,5,6
1700, 120 Adelaide Street W., — 62°12'W, 101°25'W
Toronto, Ontario,
M5H 1T1

REFERENCES

Laporte (1981); Wright (1967).

PROPERTY

The 712 claims explored are listed in Figure IV-8.

LOCATION

The property is southwest of Kamilukuak Lake (Fig. IV-8).

HISTORY

Four hundred and sixty-nine P claims were staked in August and September, 1976 during reconnaissance geological mapping, prospecting and radiometric surveys of the area. The remaining 243 claims were added to the property in 1977. The HO 1, 2 and 3 claims were added to the property in 1978; the P 162 to 227 claims were restaked as P 471 and 472 and SHUR 19, 22 and 23 as the SHUR 19 and 22 claims.

DESCRIPTION

Wright (1967) mapped a 20-km wide arcuate belt of Dubawnt Group porphyrytic flows trending south from Dubawnt Lake to south of Kamilukuak and Nowleye Lakes. The claims cover part of this belt south of Kamilukuak Lake and the unconformity between the Helikian flows and the Archean-Aphebian granitic basement complex.

Detailed geological mapping by Cominco geologists in 1977 and 1978 indicates that the basement complex comprises granite-granodiorite gneisses, augen gneiss, biotite-rich paragneiss and migmatite. The Dubawnt Group includes trachy-basalt flows and breccias, and trachandesite flows, breccias and tuffs. The subaerial alkali volcanic rocks are interbedded with waterlain tuffs, wackes, siltstone and chert. Both the basement and volcanic rocks are intruded by a suite of syenitic rocks including synvolcanic lopoliths, sills and dykes of latite porphyry, bostonite and minette and subporphyrytic syenite. The bostonite dykes contain 0.03 to 0.05% U_3O_8.

CURRENT WORK AND RESULTS

Work in 1978 included mapping, at 1:10,000, of the southeast and western part of the property and of the SORAS, SORFOT and BE claims; establishment of a 120 line-km grid over the southeast part of the property; 73 km of VLF-EM surveys and 112 km of magnetometer and spectrometer surveys on the grid; radon cup surveys over three showings; blasting of 10 pits; an investigation of the Pleistocene geology of the area; and soil and rock geochemical surveys.

Three types of occurrences were discovered. Uranium fills fractures in trachyandesite, lapilli tuff and greywacke in three locations. Grab samples from boulders contained up to 0.18% U_3O_8. Mineralized brecciated gneiss boulders were discovered in two areas, containing veins of pitchblende, galena or pyrite and 0.01 to 2.3% U_3O_8. The third type of occurrence consists of uranium in trachyandesite lapillistone, water lain tuff and greywacke. Boulders contained up to 7.3% U_3O_8 and 32 samples averaged 2.5% U_3O_8.

KAM LAKE PROJECT — Uranium
Noranda Exploration Company Ltd., — 65 K/3,4,5,6
P.O. Box 1619, — 62°13'N, 101°35'W
Yellowknife, N.W.T.
X1A 2P2

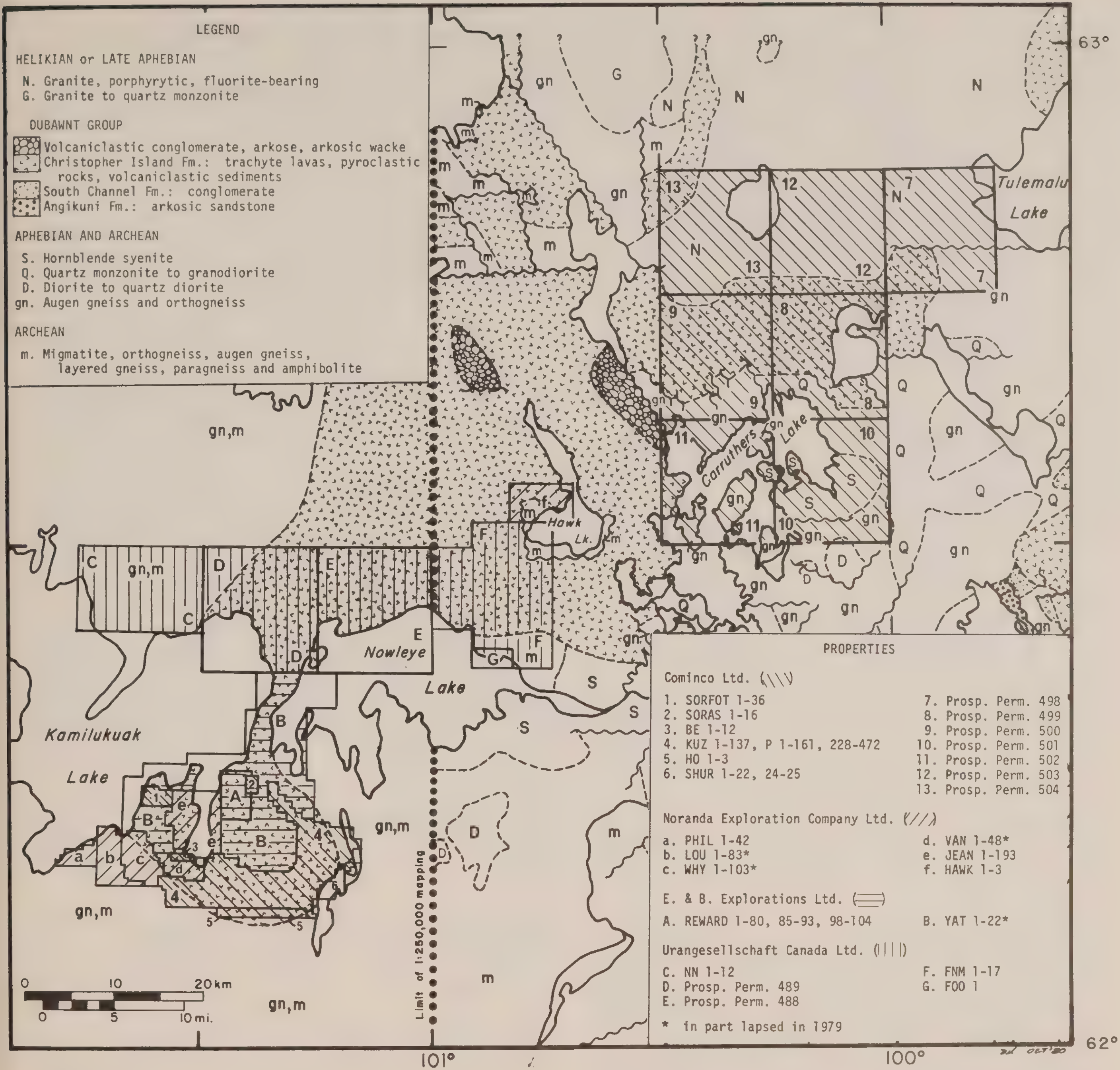


FIGURE IV-8: Geology of the Nowleye-Kamilukuak Lakes area and location of properties (geology from Blake, 1980; Eade and Blake, 1977; Tella and Eade, 1980 and Wright, 1967).

REFERENCES
Laporte (1981); Wright (1967).

PROPERTY
The 471 claims staked as part of this project are listed in Figure IV-8.

LOCATION
The claims are south of Kamilukuak Lake (Fig. IV-8).

HISTORY
The LOU and WHY claims were recorded in July, the PHIL claims in August and the JEAN and VAN claims in October, 1977.

DESCRIPTION
The claims cover the centre and western edge of the southern part of a belt of Dubawnt Group volcanic flows extending from Dubawnt Lake to south of Kamilukuak Lake. The Helikian rocks unconformably overlie a basement complex of Archean and Aphebian granitic gneisses.

Uranium-rich boulders of four lithologies were discovered in 1977: dacitic dyke, Dubawnt Group intermediate volcanics and pyroclastics, syenitic rock and quartz-feldspar mylonite (Laporte, 1981).

CURRENT WORK AND RESULTS
The unconformity was prospected and mapped and detailed surveys were undertaken on grids. On the JEAN

claims a 37 line-km grid was surveyed with magnetometer and VLF-EM. VLF anomalies were detected near the head of a 1,000 m long train of granitic boulders containing 0.02 to 0.622% U_3O_8. One drill hole, 113.1 m long, did not intersect significant uranium concentrations.

The centre of the grid on the PHIL claims (Laporte, 1981) was surveyed with magnetometer and VLF-EM. Only 4 of 13 Winkie holes, totalling 107.3 m, intersected bedrock and none intersected uranium concentrations.

The grid on the WHY claims (Laporte, 1981) was extended to the northeast and south, mapped and prospected. Magnetometer and VFL-EM surveys on the grid extensions outlined anomalies to the northeast but none to the south.

REWARD AND YAT CLAIMS
E. & B. Explorations Ltd.,
300 Fifth Avenue S.W.
Calgary, Alberta
T2P 3C4

Uranium
65 K/3,4,5,6
62°15'N, 101°25'W

REFERENCES
Wright (1967).

PROPERTY
REWARD 1-80, 85-93, 98-104
YAT 1-22

LOCATION
The claims are south and east of Kamilukuak Lake (Fig. IV-8).

HISTORY
The REWARD claims were staked in September, 1977 and the YAT claims in February, 1978.

DESCRIPTION
The claims cover the southern parts of a belt of Dubawnt Group volcanics extending south from Dubawnt Lake to Kamilukuak Lake.

CURRENT WORK AND RESULTS
Geological mapping at 1:10,000, prospecting, 435 line-km of radiometric surveying along lines 500 m apart and a 309-sample lake bottom geochemical survey outlined two uranium concentrations in volcanic flows, three linear trains of uranium-bearing bostonite boulders and one of uranium-bearing syenite boulders. Grids established on the bostonite boulder trains were explored with magnetometer and Max-Min EM surveys, detailed mapping at 1:2500 and a 152-sample geochemical soil survey. Seven drill holes, totalling 899.7 m, tested the sources of the bostonite boulder trains. Five holes on two zones failed to intersect uranium concentrations and two holes on the third zone intersected bostonite dykes with 0.030 to 0.039% U_3O_8.

NOWLEYE LAKE PROJECT
Urangesellschaft Canada Ltd.
3100, 2 Bloor Street E.,
Toronto, Ontario
M4W 1A8

Uranium
65 K/5,6,7
62°27'N, 101°12'W

REFERENCES
Tella and Eade (1980); Wright (1967).

PROPERTY
The claims and prospecting permits explored are outlined and listed on Figure IV-8.

LOCATION
Prospecting Permits 488 and 489 cover the northwest shore of Nowleye Lake and the northeast shore of Kamilukuak Lake. The FNM and FOO claims cover the northeast shore of Nowleye Lake and the NN claims the north central shore of Kamilukuak Lake (Fig. IV-8).

HISTORY
Prospecting Permits 488 and 489 were acquired on January 1, 1978. The FNM 1-17 and NN 1-12 claims were recorded in August 1978 and the FOO claims in September, 1978.

DESCRIPTION
The project area is underlain by volcaniclastic sedimentary rock, pyroclastic rocks and mafic and felsic trachyte flows of the Christopher Island Formation. Gneisses and migmatites of the basement complex outcrop in the southeast corner of the FNM and FOO claim block and the western part of the NN claims.

CURRENT WORK AND RESULTS
The prospecting permits were explored by: reconnaissance geological mapping at 1:63,360; airborne radiometric and VLF-EM surveys at 400 m spacing; lake water and sediment sampling at a density of one site per 2.5 square km; and 40,000 m of gridding on Prospecting Permit 489.

The claims, staked to protect extensions of the basement complex-Christopher Island Formation unconformity, were explored with: airborne radiometric prospecting along the unconformity; detailed airborne VLF-EM and spectrometer surveys at 200 m intervals; and lake water and sediment sampling at a density of one site per 2.5 square km.

HAWK LAKE PROJECT
Noranda Exploration Company Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T.
X1A 2P2

Uranium
65 K/10
62°33'N, 100°45'W

REFERENCES
Tella and Eade (1980); Wright (1967).

PROPERTY
HAWK 1-3

LOCATION
The claims are northeast of Nowleye Lake (Fig. IV-8).

HISTORY
Noranda Exploration Company Ltd. registered the claims in July, 1978.

DESCRIPTION
The claims cover the faulted contact between Dubawnt Group Christopher Island Formation volcanics and migmatites of the Aphebian-Archean basement complex.

CURRENT WORK AND RESULTS
Regional prospecting of the Dubawnt Group-basement complex unconformity led to the staking of the HAWK claims; parts of which were then surveyed with magnetometers, VLF-EM and scintillometers. Three Winkie drill holes, totalling 36.9 m, were drilled.

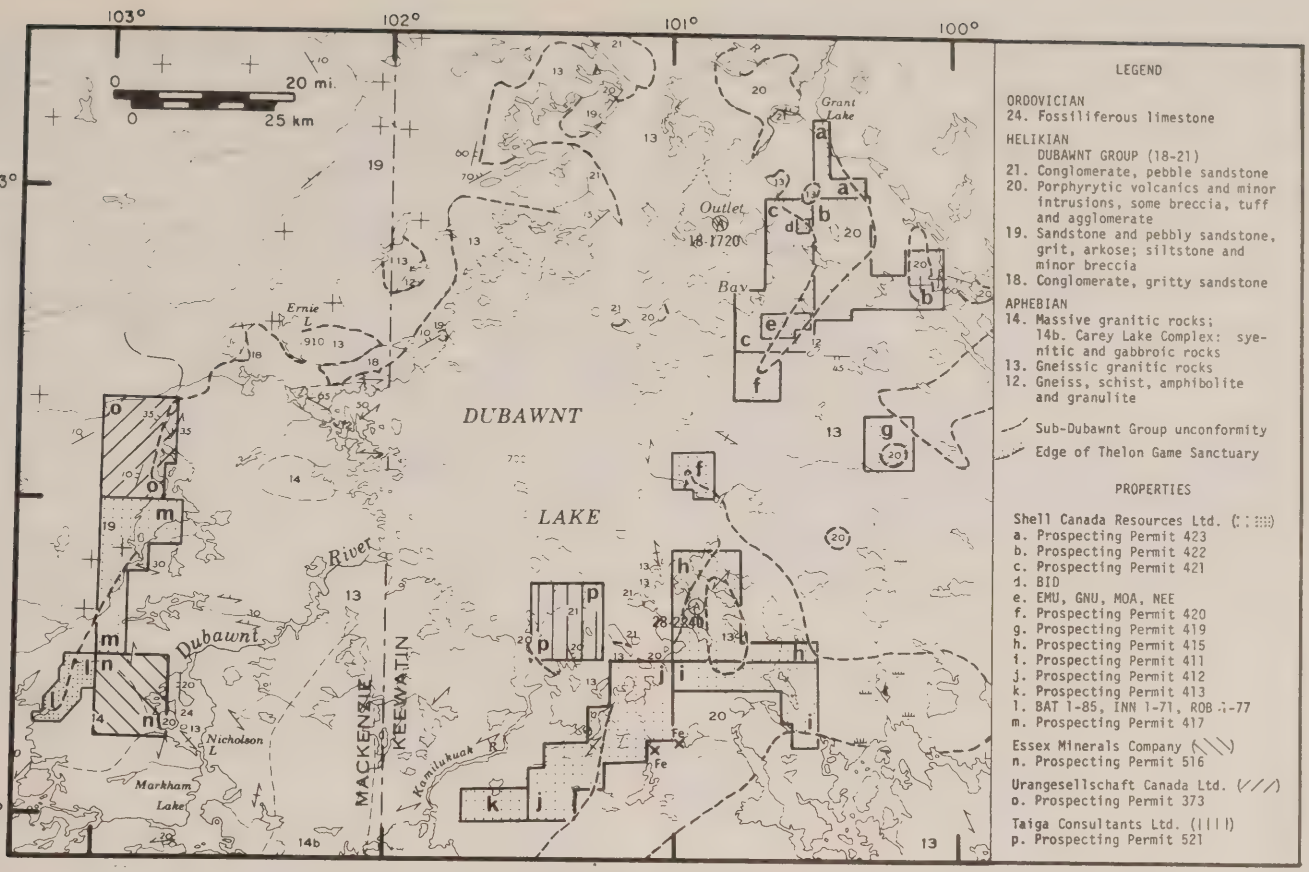


FIGURE IV-9: Geology of the Dubawnt Lake area and location of properties (geology from Wright, 1967).

DUBAWNT LAKE PROJECT — Uranium
Shell Canada Resources Ltd. — 65 K, L, N
Box 100 — $65^{\circ}05'$N, $101^{\circ}30'$W
Calgary, Alberta
T2P 2H5

REFERENCES

Laporte (1981); Wright (1967).

PROPERTY

The 10 prospecting permits and claims held by Shell Canada Resources Ltd. in the vicinity of Dubawnt Lake are listed in Figure IV-9.

LOCATION

The permits cover the eastern, southern and southwestern shores of Dubawnt Lake (Fig. IV-9). The claims are southwest of Prospecting Permit 417 and east of Outlet Bay.

HISTORY

Shell Canada Resources Limited acquired Prospecting Permits 411 to 423 in 1976. Prospecting Permits 414, 416 and 418 were relinquished in 1977 and the others expired in 1979. The BAT, INN and ROB claims were acquired in October, 1976 and August, 1977. The BID, EMU, GNU, MOA, and NEE claims were recorded in October, 1978.

DESCRIPTION

Archean and Aphebian granitic gneisses underlie most of the permit areas. A 13-km wide and 64-km long north-trending arcuate belt of Helikian Christopher Island Formation volcanics overlie the basement complex east of Outlet Bay. A 16- to 32-km wide northeast-trending belt of Christopher Island Formation volcanics and Thelon Formation sandstone outcrops on a peninsula jutting north into Dubawnt Lake and on the southeastern shore of the lake.

CURRENT WORK AND RESULTS

Four grid areas were explored: the PSM grid south of the NEE claim, the JG South grid on the EMU claim, the Block 30-78 grid on the BID claim and the Thelon-Contact grid on the BAT claims.

The PSM grid covers a concentration of anomalously radioactive felsic crystal tuff boulders. Prospecting, magnetometer and VLF-EM surveys did not outline economic concentrations of uranium or structural zones in which uranium could have been concentrated.

Prospecting, magnetometer, VLF-EM and Track Etch surveys were done on the Thelon-Contact grid where three single station Track Etch anomalies were detected in 1977. These anomalous Track Etch readings were caused by radioactive granite and aplite intrusions of no economic potential.

Prospecting and Track Etch surveys on the Block 30-78 showing were done to determine whether the sub-ore grade uranium concentrations, detected in the Christopher Island volcanics during the 1977 drilling (Laporte, 1981) extended to and were enriched at the contact with the 'Outlet Bay Granite'. No additional occurrences or Track Etch anomalies were detected.

Surveys on the JG grid explored the areas up-ice from the JG showing drilled in 1977 (Laporte, 1981). Prospecting, magnetometer, VLF-EM and Track Etch surveys and 820 m of diamond drilling in 11 holes failed to locate the source of the uranium-bearing boulders.

PROSPECTING PERMIT 516
Essex Minerals Company,
1208, 7 King Street E.,
Toronto, Ontario,
M5C 1A2

Uranium
65 L/10
62°42'N, 102°52'W

REFERENCES

Laporte (1974a); Wright (1967).

PROPERTY

Prospecting Permit 516

LOCATION

The permit covers the west shore of Nicholson Lake (Fig. IV-9).

HISTORY

Questor Surveys Limited flew a gamma-ray spectrometer survey of the area in August, 1969 for Can Del Oil Limited, Trans-Canada Resources Limited and Uno-Tex Petroleum Corporation. Subsequent scintillometer surveys and prospecting of ten anomalies detected no radioactive minerals, but a shear zone containing up to 10% sulphides was staked as the KLAUS claims (Laporte, 1974a).

Prospecting Permit 516 was acquired by Essex Minerals Company in 1978 and relinquished in 1979.

DESCRIPTION

The area west of Nicholson Lake is underlain by massive granitic rocks. Porphyritic volcanic flows of the Dubawnt Group and Ordovician limestones outcrop on islands and peninsulas in the lake.

CURRENT WORK AND RESULTS

Geological mapping and prospecting of the permit did not outline any economic concentrations of uranium.

P.O. LAKE PROJECT
Pan Ocean Oil Ltd.
300 Fifth Avenue S.W.,
Calgary, Alberta
T2P 2M7

Uranium
65 O/1,2
63°07'N, 98°30'W

REFERENCES

Laporte (1981); LeCheminant and others (1979a, 1980).

PROPERTY

The five prospecting permits and 10 claims explored are listed in Figure IV-10.

LOCATION

The area explored extends north and west from Nutarawit Lake (Fig. IV-10).

HISTORY

Prospecting Permit 369 was acquired in 1976 and expired in 1979. It was discussed in Laporte (1981) as part of the LGT'75 Project. Prospecting Permits 479 to 480 were acquired in 1978. The NU claims were recorded in October 1978 and cover showings within the area of Prospecting Permit 369.

DESCRIPTION

Irregularly layered granitoid gneisses and migmatite outcrop on the north shore of Nutarawit Lake and in a 10- to 15-km area trending northeast across 'P.O.' Lake (Fig. IV-10). These gneisses are overlain west of Nutarawit Lake and north of 'P.O.' Lake, by arkosic sediments and trachytic volcanics of the Helikian Dubawnt Group. Helikian and late Aphebian granite and syenite intrude the basement gneisses and the Dubawnt Group rocks north of Nutarawit Lake and southwest and west of 'P.O.' Lake. Numerous syenite and porphyritic microsyenite/bostonite dykes intrude the basement complex and Dubawnt Group assemblage on the west shore of Nutarawit Lake.

CURRENT WORK AND RESULTS

Regional surveys included a 773-sample lake water and sediment geochemical survey, 5,657 line-km of radiometric, magnetic and VLF-EM surveys flown by Kenting Earth Sciences Ltd. along lines 200 m apart and subsequent reconnaissance mapping and prospecting of the anomalies outlined on Prospecting Permits 479 to 482. Detailed surveys on 13 grids included geological mapping, prospecting, scintillometer and magnetometer surveys and on one grid, a 65-site Alphameter radon survey. Forty-two diamond drill holes totalling 2,549 m and 20 Winkie drill holes totalling 107 m probed uranium showings on 9 of these grids.

Most of the showings probed are dykes and irregular bodies of microsyenite which intrude both the basement complex and the overlying Dubawnt Group sediments and volcanics. The dykes are 20 to 30 m wide and 150 to 350 long. The microsyenite contains 50 to 550 ppm U and up to 1,800 ppm Th. Uranium is concentrated at two places on the fractured margin of one microsyenitic dyke. Core samples from one concentration contained 0.3% U over 0.3 m and from the second, 1.35% U and 1.1% U over 0.3m.

One of the showings drilled consists of pitchblende and calcite veins in sheared and altered mafic gneiss. Drilling indicated that the veins do not extend to a depth greater than 12 m but can be traced 17 m along strike. Eight holes intersected the vein system which contains an average of 1.18% U_3O_8 over 0.46m.

A series of 2- to 3- cm wide uranothorite-magnetite veins in mafic gneiss was probed with a single Winkie hole. Surface grab samples of the veins averaged 168.3 ppm U and 3,790 ppm Th.

THIRTY MILE LAKE PROJECT
Urangesellschaft Canada Ltd.
3100, 2 Bloor Street E.,
Toronto, Ontario
M4W 1A8

Uranium
65 O/7,8,9; P/13
63°37'N, 98°15'W

REFERENCES

Laporte (1981); LeCheminant and others (1979a, b, 1980).

PROPERTY

The prospecting permits and claims explored as part of the Thirty Mile Lake Project are listed in Figure IV-10.

LOCATION

The Thirty Mile Lake Project covered parts of the area between the Kunwak River to the northwest and the Kazan River to the southeast (Fig. IV-10).

HISTORY

Prospecting Permits 374 to 376 were acquired in April, 1976. The POT 1-12 and UHT 1-3 claims were recorded in September 1978 and cover parts of Prospecting Permit 374 which expired in 1979. The other two prospecting permits were within the Baker Lake Study Area and remain valid until early 1980. The

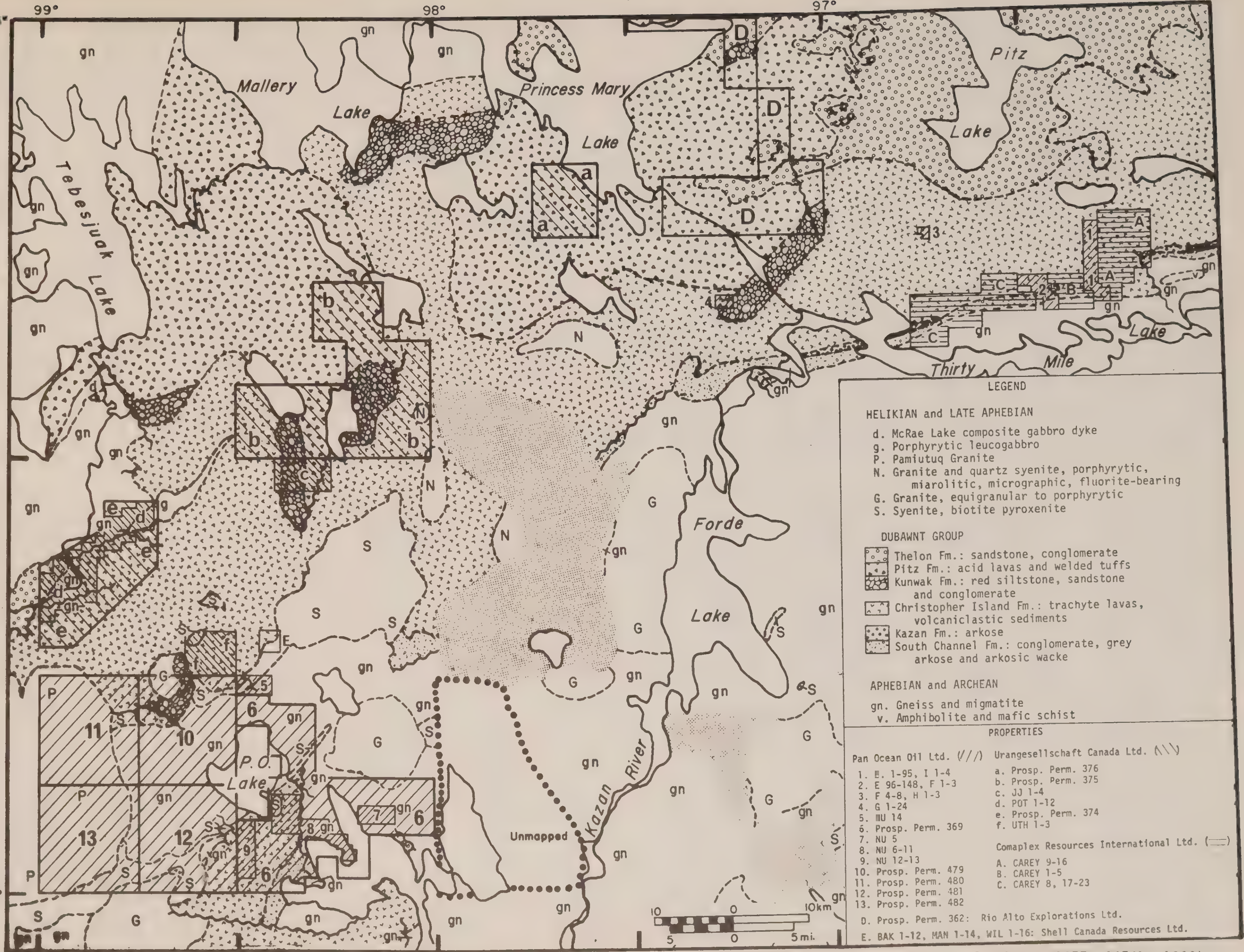


FIGURE IV-10: Geology of the Thirty Mile-'P.O.' Lakes area and location of properties (geology from LeCheminant and others, 1977, 1979b, 1980).

JJ 1-4 claims were acquired in November, 1978.

DESCRIPTION

The project area is underlain mainly by Dubawnt Group volcanics, the Christopher Island Formation and Pitz Formation. Trachytic lavas and tephra of the lowermost Christopher Island Formation are overlain to the north and east by dacite and rhyolite flows and welded tuffs of the Pitz Formation.

Fanglomerate, red siltstone, sandstone and conglomerate of the Kunwak Formation outcrop at the contact of the two volcanic units in the northeastern two permits. The granitoid gneisses of the basement complex outcrop west of Princess Mary Lake and in the northeast corner of Prospecting Permit 374. Thelon Formation sandstone, pebbly sandstone and conglomerate outcrop on the southeast shore of Princess Mary Lake.

CURRENT WORK AND RESULTS

The areas of Prospecting Permit 374 now held as the POT and UHT claims were explored with prospecting and geological mapping at a scale of 1:31,680 and a lake sediment and water geochemical survey. Reconnaissance prospecting was also done in the southern portion of Prospecting Permit 375.

CAREY CLAIMS — Uranium
Comaplex Resources International Ltd. — 65 P/9,10
901, 1015 Fourth Street S.W. — $63^{o}37'N, 96^{o}30'W$
Calgary, Alberta
T2R 1J4

REFERENCES

Laporte (1974a, b, 1979), LeCheminant and others (1977).

PROPERTY

The three CAREY groups are listed in Figure IV-10.

LOCATION

The CAREY claims cover parts of the area north of Thirty Mile Lake (Fig. IV-10).

HISTORY

The area north of Thirty Mile Lake has been held as Prospecting Permits 212 and 213 by New Continental Oil Ltd. from 1970 to 1973 (Laporte 1974a, b) and as Prospecting Permits 342 and 343 by Pan Ocean Oil Ltd. from 1974 to 1977 (Laporte 1979). The CAREY claims were staked in April, 1978.

DESCRIPTION

The eastern group of CAREY claims is underlain by volcanic flows and volcanoclastic sediments of the Dubawnt Group Christopher Island Formation. These rocks unconformably overlie the basement complex which outcrops south of the claims.

On the western groups, Dubawnt Group South Channel Formation conglomerate and Kazan Formation arkose separate the basement complex to the south from Christopher Island Formation to the west. The contact between the conglomerate and basement is unconformable.

CURRENT WORK AND RESULTS

Exploration of the CAREY claims included airborne radiometric surveys along lines 200 m apart; detailed airborne surveys of areas of outcrop along lines 50 to 100 m apart; lake sediment and water surveys with the 502 sediment and 519 water samples collected being analyzed for U, Cu, Zn and Ni; prospecting of radioactive areas; and the detailed study of two uranium occurrences using trenching, geological mapping, magnetometer, VLF-EM, IP and Max Min EM surveys.

Five uranium showings were discovered by prospectors. The two showings explored in detail consist of uranium and copper (digenite and malachite) concentrations in altered trachyte flows of the Christopher Island Formation. On the NO-1 grid, the alteration is related to fracturing. Grab samples of altered flows contained up to 0.460% U_3O_8, 11.21% Cu and 89 ppm Ag. On the PJ grid, the alteration involves chloritization, silicification, calcification and hematization at the contact between two flows. Samples of the altered material contained as much as 3,920 ppm U_3O_8, 8,350 ppm Cu and 1.6 ppm Ag.

WHITEHILLS LAKE PROJECT — Uranium
Urangesellschaft Canada Ltd., — 56 D/12,13
3100, 2 Bloor Street E., — $64^{o}45'N, 96^{o}45'W$
Toronto, Ontario,
M4W 1A8

REFERENCES

Laporte (1974a); Wright (1967).

PROPERTY

Prospecting Permits 529 to 532 explored as the Whitehills Lake project are shown in Figure IV-11.

LOCATION

The prospecting permits cover the area between Whitehills Lake to the southwest and Tehek Lake to the north and east (Fig. IV-11).

HISTORY

Prospecting Permits 529 and 530 cover the north half of the area held as Prospecting Permit 107 by Canadian Export Gas & Oil Limited and Canadian Homestead Oils Limited from April, 1969 to March, 1972. These two companies explored the area with photogeological, airborne radiometric and magnetometer surveys in 1969 and a scintillometer prospecting program in 1970 (Laporte, 1974a). Prospecting Permits 529 to 532 were applied for in late 1976 to cover anomalies detected during a lake water and sediment geological survey done in the summer of 1976. The issuance of the permits was deferred for one year. In 1977 an airborne radiometric and magnetometer survey totalling 1,062 line-km at 400 m spacing was conducted. The permits came into effect on January 1, 1978.

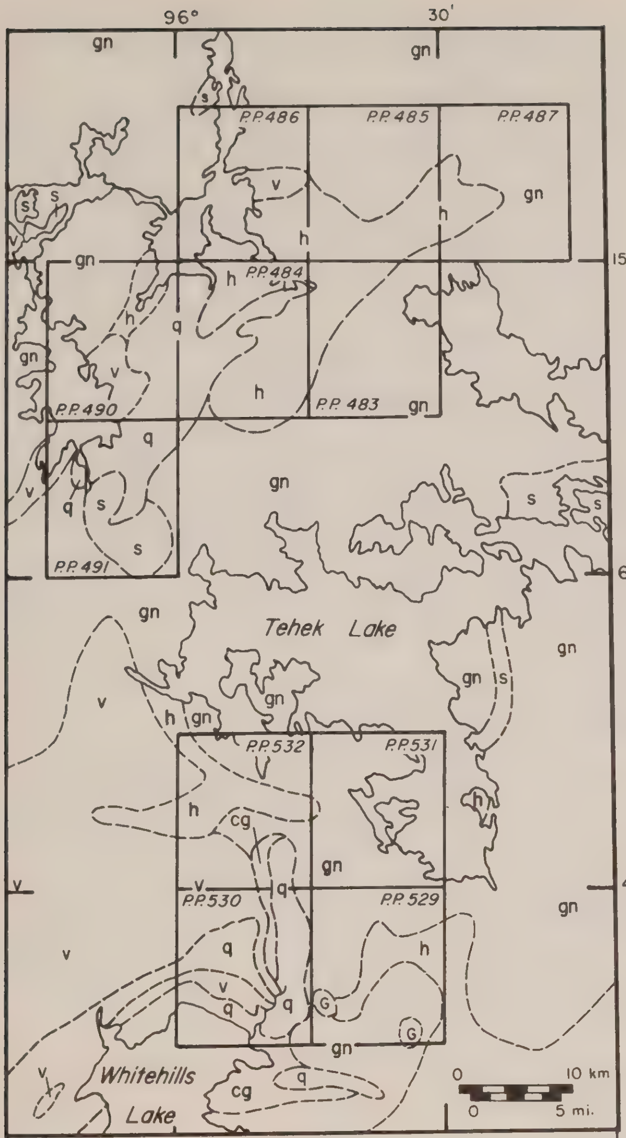
DESCRIPTION

Permits 529-532 cover the eastern part of a supracrustal belt extending east from Judge Sissons Lake to north of Whitehills Lake. The belt consists of a core of schistose greywacke enclosing volcanic flows which are overlain to the southeast, east and west by Hurwitz Group quartzitic sediments and orthoquartzite. Volcanic flows occupy the axis of a synform in orthoquartzite on the north shore of Whitehills Lake.

The eastern two permits are underlain by granitic gneisses. Metasediments of the Hurwitz Group outcrop south and east of the permits and in the northern part of the southeast permit.

CURRENT WORK AND RESULTS

In 1978, work consisted of reconnaissance geological mapping, 467 line-km of airborne radiometric, VLF-EM and magnetometer surveys and



LEGEND

APHEBIAN AND ARCHEAN

G. Diorite and gabbro
gn. Granite, granodiorite and allied rocks; in part gneissic and impure
s. Schist, gneiss and granulite

HURWITZ GROUP (h, cg, q)

h. Undifferentiated sedimentary rocks (cg, q)
cg. Greywacke and impure quartzite, conglomerate, dolomite and limestone, quartz-mica schist
q. White quartzite, some impure quartzite and gritty sandstone, minor pebble conglomerate
v. Intermediate to basic volcanic rocks, derived amphibole schist, schistose greywacke

FIGURE IV-11: Geology of the Whitehills-Tehek Lakes area and location of Urangesellschaft Canada Ltd. prospecting permits (geology from Wright, 1967).

detailed prospecting in the vicinity of geochemical and geophysical anomalies. The anomalies are due to local radioactive concentrations in granite and to granitic boulder fields.

AMER-WOODBURN PROJECT | Uranium
Urangesellschaft Canada Ltd., | 56 E/4,5,6; 66 H/1
3100, 2 Bloor Street E., | 65°12'N, 95°45'W
Toronto, Ontario,
M4W 1A8

REFERENCES
Wright (1967).

PROPERTY
Prospecting Permits 483-487, 490-91.

LOCATION
The permits cover a northeast-trending area north of Tehek Lake (Fig. IV-11).

HISTORY
Prospecting Permits 483-487 and 490-491 were acquired in early 1978.

DESCRIPTION
The permits cover a northeast-trending belt of Aphebian Hurwitz Group metasediments flanked, to the northeast and west, by greenstones, possibly of Archean age. Orthoquartzite is the main sediment in the southwest part of the belt; more pelitic sediments form the eastern part of the belt (Fig. IV-11).

CURRENT WORK AND RESULTS
The easternmost five permits were explored with radiometric and VLF-EM surveys and prospected at 1:63,360 scale. Prospecting of radiometric anomalies detected by the airborne surveys led to the discovery of uranium showings which were trenched, chip sampled and mapped in detail.

PROJECT K-1, BAKER LAKE | Uranium
Urangesellschaft Canada Ltd. | 66 A/5,6,7,10,12; B/8
3100, 2 Bloor Street E., | 64°30'N, 97°30'W
Toronto, Ontario
M4W 1A8

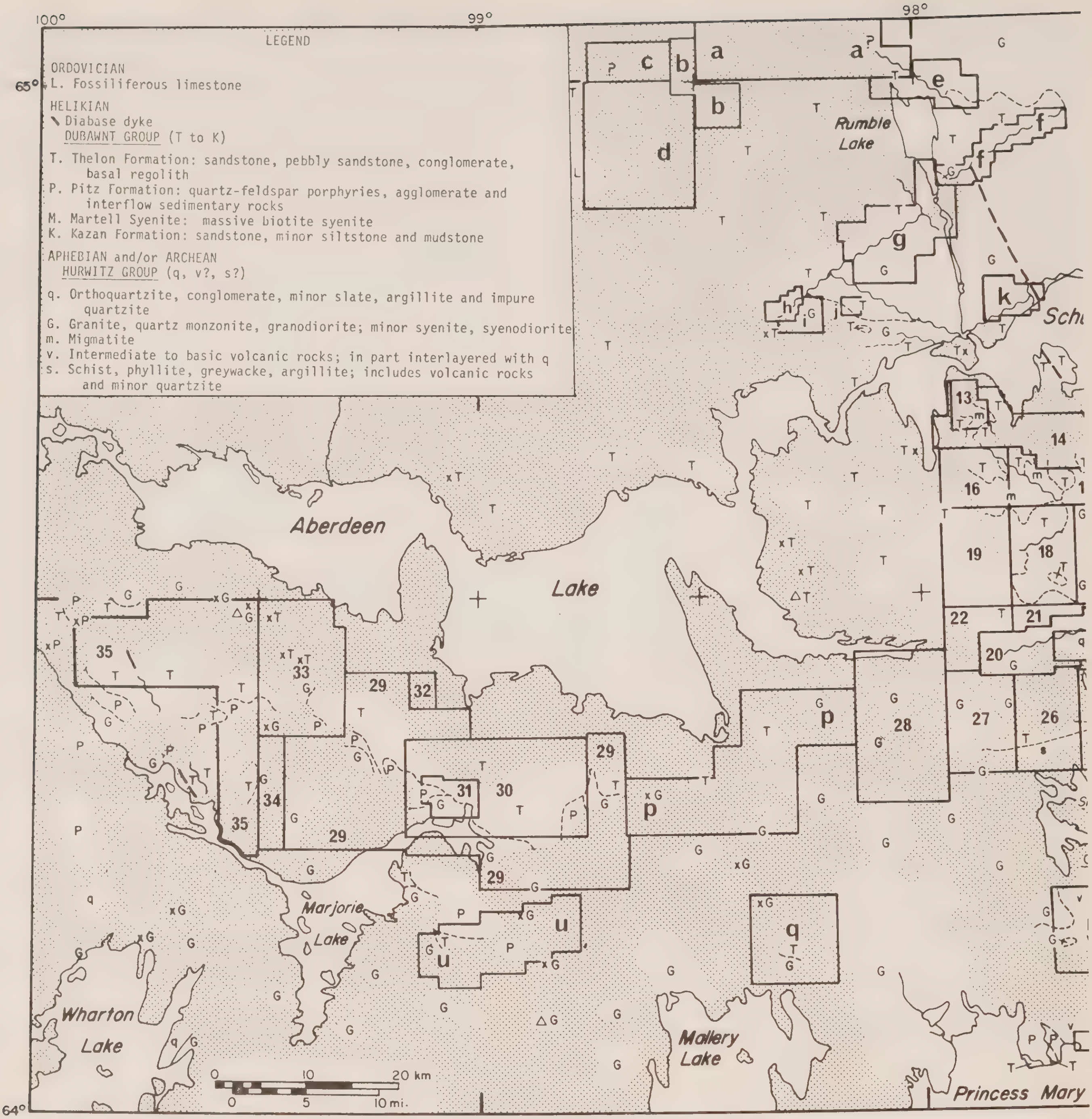
REFERENCES
Donaldson (1966, 1969); Laporte (1977, 1981).

PROPERTY
The prospecting permit and claims held by Urangesellschaft Canada Ltd. and forming part of this project are listed in Figure IV-12.

LOCATION
Project K-1 explored the area extending north and northeast from Judge Sissons Lake to Schultz Lake and the Thelon River.

HISTORY
Urangesellschaft Canada Ltd. has been exploring the Judge Sissons Lake area since 1974 when an affiliated company, Metallgesellschaft Canada Ltd. acquired Prospecting Permits 317 to 327 (Laporte, 1977). Urangesellschaft Canada Ltd. acquired Prospecting Permits 352 and 353 in 1975. The SCH 1-136 and SSL 1-128 claims were acquired in 1976 and the IT 1-591, L 1-620, PIZ 1-236 and THE 1-82 in 1977. Numerous other claims were acquired in 1978 following the lifting of the moratorium on land acquisition in tht Baker Lake Study Area.

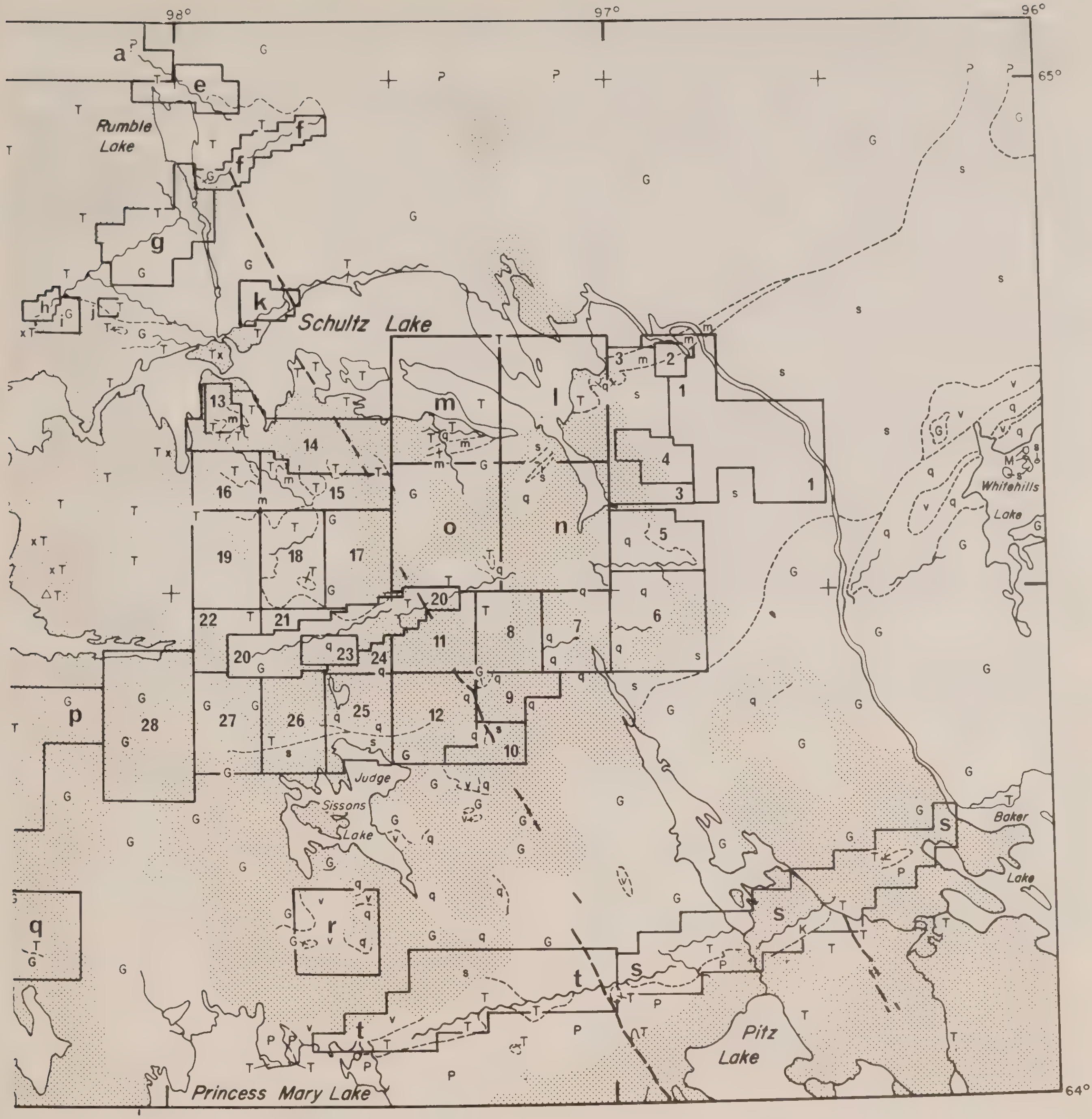
DESCRIPTION
The project involved a study of the western end of a northeast-trending metasedimentary belt extending from Judge Sissons Lake to north of Whitehills Lake. The belt is bounded to the north and south by granitic



URANGESELLSCHAFT CANADA LTD.

1. Prosp. Perm. 353
2. THE 1-82
3. OFF 1-12
4. PIZ 1-236
5. COO 1-8
6. LA 1-12
7. DOVA 1-8
8. SHAY 1-8
9. TREE 1-4
10. MOR 1-4
11. OTHA 1-8
12. BAR 1-10
13. SCH 1-136
14. IT 1-591
15. AJOL 1-8
16. WUNZ 1-6
17. MAN 1-8
18. WAG 1-8
19. LYS 1-8
20. L 1-620
21. PED 1-4
22. CAM 1-6
23. SSL 1-128
24. BYA 3-6
25. UND 1-8
26. BONG 1-8
27. BILA 1-8
28. BS 1-14
29. MAJ 11-61
30. BB 1-25
31. AB 1-100, 152-199
32. BAJ 1-2
33. BA 1-18
34. BAJ 3-6
35. Prosp. Perm. 377

FIGURE IV-12: Geology of Shultz-Aberdeen Lakes area and



WESTERN MINES LTD.

a. Prosp. Perm. 425
b. CAN 1-178
c. WGE 1-4
d. Prosp. Perm. 541

BP MINERALS LTD.

l. Prosp. Perm. 533
m. Prosp. Perm. 534
n. Prosp. Perm. 535
o. Prosp. Perm. 536

ESSEX MINERALS COMPANY

e. ALA 1-5
f. 200 CAN
g. ALL 1-13
h. RB 1-50
i. ALE 2-5
j. ALE 1
k. KEN 1-185

MARLINE OIL CORPORATION

p. W 1-23
q. V 26-34
r. V 35-43

NORANDA EXPLORATION COMPANY LTD.

s. JIL 1-25
t. LIL 1-22
u. VLAD 1-11

location of properties (geology from Donaldson, 1966, 1969).

gneisses and the sediments are overlain to the southwest by sandstone, pebbly sandstone and conglomerate of the Thelon Formation. A regolith is present locally at the base of the Thelon Formation.

Drilling of a geochemical and geophysical anomaly in 1977 intersected 1.0% U_3O_8 over 21.3 m. The uranium occurs as sooty pitchblende and is associated with an alteration halo similar to that at Rabbit Lake in Saskatchewan.

CURRENT WORK AND RESULTS

The new claims acquired in 1978 were explored with prospecting and mapping at a scale of 1:31,680, geochemical surveys of uranium in water and sediment samples, and 6,186 line-km of radiometric, VLF-EM and magnetometer surveys along lines 200 m apart. The main grid, on the SSL claims, was extended to the east and north and two new grids were established to the west. The main grid extensions were explored with ground VLF-EM and magnetometer surveys, Ao horizon soil sampling, mapping and prospecting. The main grid was explored with VLF-EM, magnetometer and IP surveys, frost boil geochemical sampling and Alpha Nuclear radon surveys. Thirty-seven holes, totalling 3547.9 m, probed the extension of the uranium deposits discovered in 1977. Six separate mineralized lenses are thought to occur over a strike length of 1,600 m in impure quartzites of the Hurwitz Group and in granite and feldspar porphyry bodies. An extensive alteration aureole about the deposits is characterized by the development of kaolinite, limonite, hematite and chlorite.

PROSPECTING PERMITS 533 TO 536 — Uranium
BP Minerals Ltd. — 66 A/11
1401, 25 Adelaide Street E., — 64°37'N, 97°15'W
Toronto, Ontario
M5C 1Y2

REFERENCES

Donaldson (1966), Laporte (1974a).

PROPERTY

Prospecting permits 533 to 536.

LOCATION

The permits cover the area south of the east half of Schultz Lake (Fig. IV-12)

HISTORY

Aquitaine Company of Canada Ltd. held the area southeast of Schultz Lake as Prospecting Permit 163 and explored it with an airborne radiometric and magnetic survey, ground scintillometer prospecting and rock and soil geochemical surveys in 1969. An airborne EM and magnetometer survey of parts of the permit in 1970 outlined three EM conductors. BP Minerals Ltd. acquired Prospecting Permits 533 to 536 in early 1978.

DESCRIPTION

The prospecting permits cover part of the north edge of a belt of Aphebian sediments trending northeast from Judge Sissons Lake to north of Whitehills Lake. Hurwitz Group orthoquartzite, conglomerate and minor slate and argillite outcrop in the eastern and central parts of the area and are in contact, south of Schultz Lake, with greywacke and schist of Archean or Aphebian age. The western part of the area is underlain by granitic rocks.

The Helikian Thelon Formation sandstone unconformably overlies the older rocks on the south shore of Schultz Lake and in the southwest corner of the area.

CURRENT WORK AND RESULTS

Geoterrex Ltd. flew 2045 line-km of radiometric, VLF-EM and magnetic surveys along lines at 320 m intervals.

RUMBLE LAKE PROJECT — Uranium
Essex Minerals Company — 66 A/13,B/16
1208, 7 King Street E., — 64°53'N, 98°00'W
Toronto, Ontario
M5C 1A2

REFERENCES

Donaldson (1966, 1969); Laporte (1981).

PROPERTY

The claims acquired by Essex Mineral Company are listed in Figure IV-12.

LOCATION

The claims are located north and west of Schultz Lake (Fig. IV-12).

HISTORY

Essex Minerals Company acquired 641 CAN, CAR, KEN, RA, RB, RC, RED and RIVER claims in September, 1976. Claims ALA 1-5, ALE 1-5 and ALL 1-13 were recorded in May, 1978. The CAR, RA, RC, RED, and RIVER groups and 116 CAN claims lapsed in September, 1978.

DESCRIPTION

Thelon Formation sandstone and conglomerate outcrop on the north shore of Schultz Lake and southeast of 'Rumble' Lake. The sandstone unconformably overlies granitic gneisses which outcrop on an east-northeast trending belt 5 to 15 km wide. The claims cover part of the unconformity.

CURRENT WORK AND RESULTS

Eighty-eight radiometric anomalies detected during the 1976 airborne survey were examined by two-person prospecting crews. Reconnaissance geological mapping at a scale of 1:20,000 and some lake sediment sampling were done. The more interesting anomalies were also surveyed with VLF-EM, EM-17, Max Min, magnetometer and Alpha Nuclear radon detectors. Eighty-one soil samples and 148 water samples were collected in the vicinity of radioactive anomalies.

Most of the anomalies are caused by granitoid rocks, gneisses and pegmatite in outcrop or boulder fields. Ten anomalies were recommended for further work. These anomalies correspond to:

- the Thelon Formation-basement contact where the basement has been oxidized, hematized, kaolinized and sericitized and the overlying conglomerate encloses radioactive sandstone, siltstone and mudstone lenses;
- radioactive syenite boulders, a sample of which contained 11.9% U_3O_8;
- a fault zone separating basement from Thelon Formation conglomerate; and
- pyrite concentrations in gneiss boulders.

MARJORIE-ABERDEEN PROJECT — Uranium
Urangesellschaft Canada Ltd. — 66 B/5,6,7
3100, 2 Bloor Street E., — 64°10'N, 99°10'W
Toronto, Ontario
M4W 1A8

REFERENCES

Donaldson (1969), Laporte (1981).

PROPERTY

The properties explored are listed in Figure IV-12.

LOCATION

The claims and prospecting permits extend along the south shore of Aberdeen Lake, north and east of Marjorie Lake (Fig. IV-12).

HISTORY

Prospecting Permits 354 and 355 were acquired in 1975 and Prospecting Permit 377 in 1976. These permits benefit from a one year extension and will remain in good standing till 1979 and 1980 respectively. The AB claims were recorded in October, 1977 and the remainder in September and October, 1978.

DESCRIPTION

The project covers the unconformity between Aphebian or Archean granitic basement complex and Helikian sandstone of the Dubawnt Group Thelon Formation. Volcanic flows and tephra of the Dubawnt Group Pitz Formation underlie the Thelon Formation and outcrop at the unconformity.

CURRENT WORK AND RESULTS

Exploration of the unconformity east and west of the AB claims involved airborne radiometric, VLF-EM and magnetometer surveys, geological mapping, prospecting and limited drainage geochemistry. The AB claims grid was explored by geological mapping and prospecting at 1:2000 and sampling of the Ao soil horizon.

PROJECT DUBAWNT — Uranium
Western Mines Ltd. — 66 B,C,G,H
1414, 390 Bay Street,
Toronto, Ontario,
M5H 2Y2

REFERENCES

Laporte (1981); Wright (1967).

PROPERTY

The properties explored are listed in Figures IV-13 and IV-15.

LOCATION

The project extends southwest from Amer Lake to north of Aberdeen Lake (Fig. IV-13 and IV-15).

HISTORY

Prospecting Permits 425 to 427 and the U 1-159 claims were acquired in 1976. Prospecting Permit 466 and the AZW 1-30, CAN 1-178, 97 CHE, LIK 1-99, NOR 1-165 and TIB 1-196 claims were added to the property in 1977. In 1978, Prospecting Permits 468, 469, and 537 to 542 were acquired as well as the UM 1-8 and WGE 1-4 claims.

DESCRIPTION

A 20- to 30-km wide belt of Aphebian Amer Group orthoquartzite, shale, siltstone, feldspathic sandstone and dolomitic limestone trends southwest in the eastern part of the project area. The metasediments are flanked by granitic gneisses to the northwest and southeast and overlain, to the southwest, by sandstone and pebbly sandstone of the Helikian Thelon Formation.

CURRENT WORK AND RESULTS

Geoterrex Ltd. flew 5550 line-km of spectrometer, EM and magnetometer surveys over the Amer Group rocks northeast of the unconformity. The westernmost three prospecting permits and the TIB and LIK claims were explored with geological mapping, prospecting and geochemical lake bottom water and sediment surveys. Prospecting Permit 466 and the TIB and LIK claims were also explored with ground radiometric surveys along lines 1525 m and 300 m apart. The 124 water samples collected were analyzed for radon, in the field, and later for uranium. The 171 sediment samples were analyzed for copper, molybdenum, nickel, uranium and helium.

PROJECT 71-23, GARRY LAKE — Uranium
Uranerz Exploration and Mining Ltd. — 66 C,F,
2408 Tenth Avenue S.W., — 65°15'N, 100°15'W
Calgary, Alberta
T3C 0K6

REFERENCES

Laporte (1981); Wright (1967).

PROPERTY

The 132 claims and 7 prospecting permits of this project are outlined on Figure IV-14.

LOCATION

The east-trending area covered by the permits and claims is 70 km south of Garry Lake (Fig. IV-14).

HISTORY

Prospecting Permits 396 to 401 and the GRIZ, MORRIS and ROBIN claims were acquired in 1976. Prospecting Permit 445 and the URA claims were added to the property in 1977. The GRIZ 5-10, MORRIS 1-6 and ROBIN 1-2 claims lapsed in 1979.

DESCRIPTION

Helikian Thelon Formation sandstones, pebbly sandstone and conglomerate underlie the western and southeastern parts of the project area. Granitoid gneisses and intrusions outcrop in a northeast-trending, 10- to 30-km wide area in the centre of the project area, and in the northwest corner of Prospecting Permit 445. Aphebian orthoquartzite underlies the central part of the easternmost permit area. The claims cover the Thelon Formation/basement complex unconformity southwest of Prospecting Permit 396.

CURRENT WORK AND RESULTS

A helicopter-borne radiometric survey, flown along northwest-trending lines 400 m apart, explored the Thelon Formation/basement complex unconformity.

PROSPECTING PERMITS 517 TO 519 — Uranium
Essex Minerals Company — 66 F/9,10
1208, 7 King Street E., — 65°12'N, 100°30'W
Toronto, Ontario
M5C 1A2

REFERENCES

Wright (1967).

PROPERTY

Prospecting Permits 517 to 519

LOCATION

Figure IV-14 includes an outline of the prospecting permits which are south of Garry Lake.

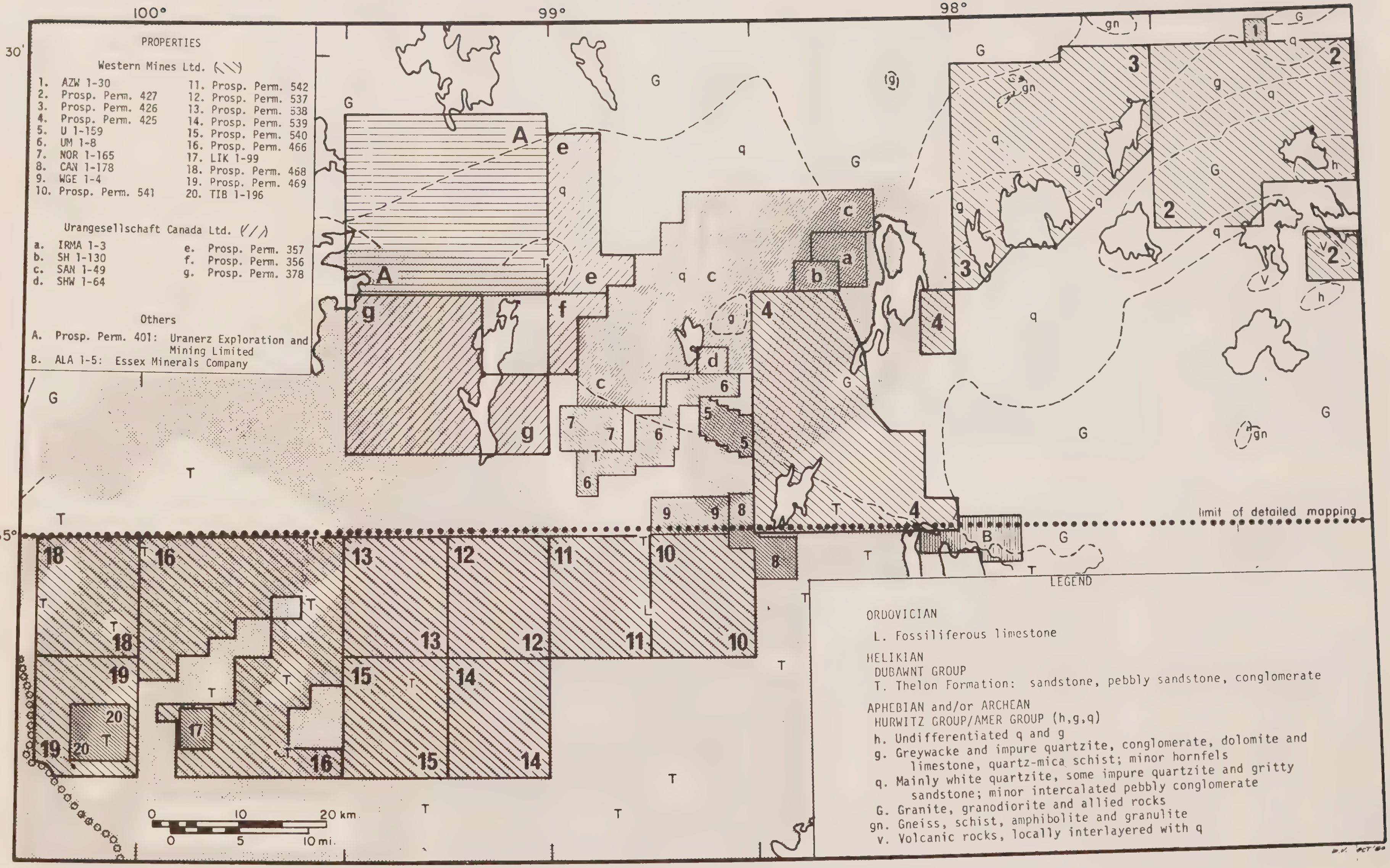
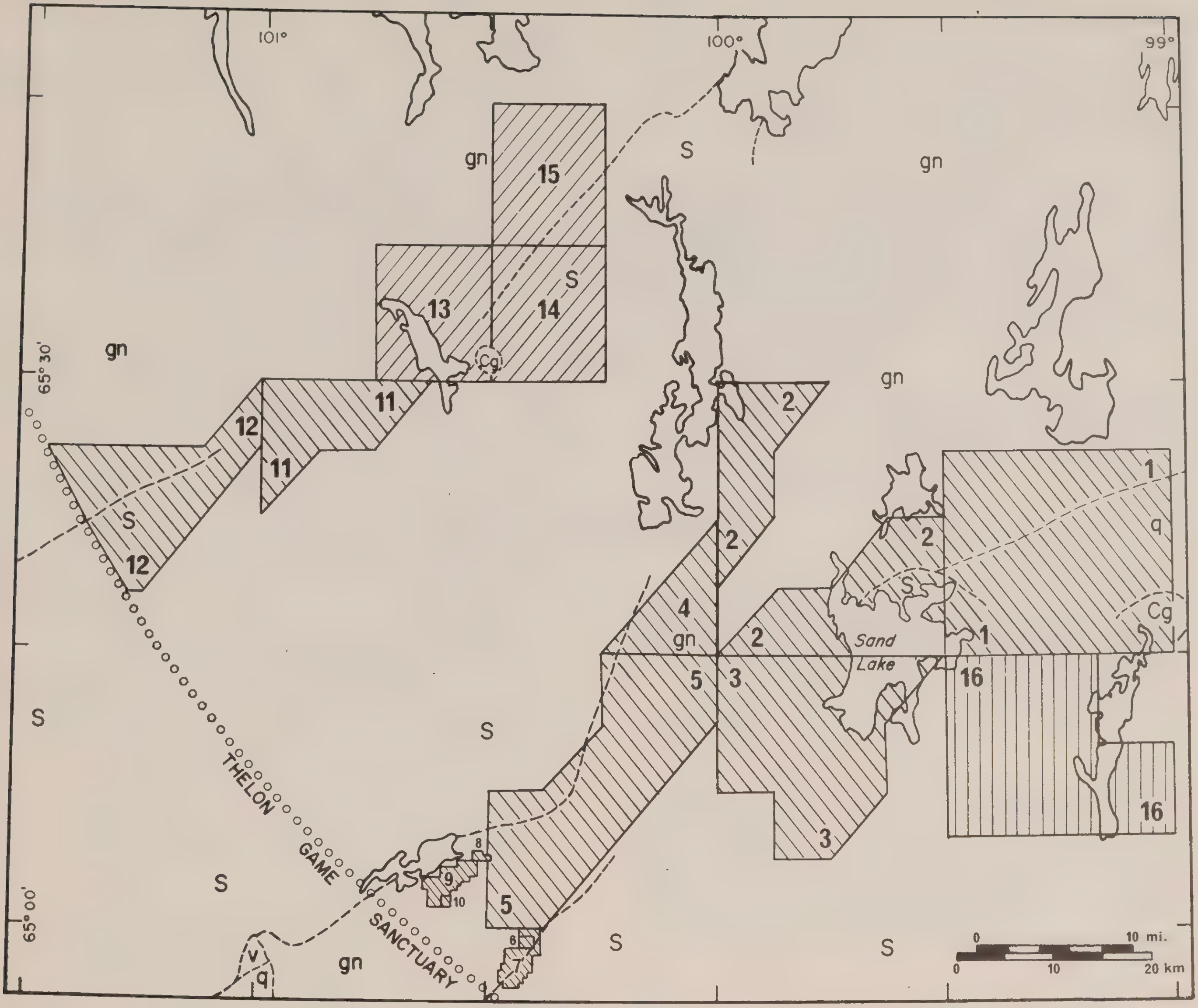


FIGURE IV-13: Geology of the area northwest of Schultz Lake and location of properties (geology from Donaldson, 1966, 1969 and Wright, 1967).



LEGEND

HELIKIAN
DUBAWNT GROUP (Cg,S)

Cg. Conglomerate, pebble sandstone
S. Sandstone and pebbly sandstone, grit arkose

APHEBIAN

gn. Granite, granodiorite and allied rocks; in part gneissic and impure

HURWITZ GROUP (q)

q. Mainly white quartzite
v. Intermediate to basic volcanic rocks

PROPERTIES

Uranerz Exploration and Mining Ltd. (\\\)

1. Prospecting Permit 401
2. Prospecting Permit 400
3. Prospecting Permit 399
4. Prospecting Permit 398
5. Prospecting Permit 396
6. GRIZ 5-12
7. URA 65-116
8. MORRIS 1-6
9. URA 1-64
10. ROBIN 1-4
11. Prospecting Permit 397
12. Prospecting Permit 445

Essex Minerals Company (////)

13. Prospecting Permit 519
14. Prospecting Permit 518
15. Prospecting Permit 517

Urangesellschaft Canada Ltd. (||||)

16. Prospecting Permit 378

FIGURE IV-14: Geology of the Sand Lake area and location of properties (geology from Wright, 1967).

HISTORY

The permits were acquired in early 1978 and relinquished in 1979.

DESCRIPTION

The unconformity between Thelon Formation sandstone to the southeast and the underlying granitic basement trends northeast across the area.

CURRENT WORK AND RESULTS

Geological mapping, prospecting and a 162-sample lake sediment geochemical survey were done. The mapping revealed the presence, within the permits, of a belt of Aphebian quartzite, sandstone and conglomerate. Some radioactive outcrops and boulders were detected but a quantitative evaluation of the radiometric readings indicate that only 1100 ppm uranium were present.

DEEP ROSE PROJECT
Urangesellschaft Canada Ltd.
3100, 2 Bloor Street E.,
Toronto, Ontario
M4W 1A8

Uranium
66 G/2,7,8
65°12'N, 98°55'W

REFERENCES

Laporte (1981); Wright (1967).

PROPERTY

The prospecting permits and claims of the Deep Rose Project, previously described as the Sandhills East and Sandhill West areas of Project K-1, Baker Lake (Laporte, 1981), are outlined on Figure IV-13.

LOCATION

The project studies cover the area east of Sand Lake.

HISTORY

Prospecting Permits 356 and 357 were acquired in April, 1975 but as a result of the Baker Lake Study Area moratorium, did not expire until April, 1979. Prospecting Permit 378 was acquired in April 1976 and remained in good standing until April, 1980. The SH 1-130 claims were acquired in 1976 and the SHW 1-64 claims in 1977. Land acquisition in 1978 involved the staking on the IRMA 1-3 and SAN 1-49 claims.

DESCRIPTION

The Deep Rose Project explored the unconformable contact between southwest-trending Amer Group metasediments and the overlying Thelon Formation sandstone and conglomerate. Orthoquartzite and dolomite of the Amer Group outcrop northeast of the unconformity which trends southeast from Sand Lake.

CURRENT WORK AND RESULTS

A 438 line-km radiometric, VLF-EM and magnetic survey was flown along lines 400 m apart in the area northwest of the SHW claims.

AMER LAKE CLAIMS
Uranerz Exploration and Mining Ltd.
2408 Tenth Avenue S.W.,
Calgary, Alberta
T3C 0K6

Uranium
66 H/7,9,10,11
65°33'N, 96°55'W

REFERENCES

Laporte (1974a, 1981); Patterson (1980); Tippett and Heywood (1978).

PROPERTY

The 380 claims explored are listed in Figure IV-15.

LOCATION

Most of the claims are south and east of Amer Lake. Two groups of ERZ claims are northeast and southwest of the lake (Fig. IV-15).

HISTORY

The ERZ claims were recorded in January 1977 and cover anomalies detected during a radiometric survey flown in 1976. Most of the other claims were staked in 1977 and the PYT 1 and SHA 1 claims were added to the property in September 1978.

DESCRIPTION

The claims cover outcrops of a feldspathic sandstone-siltstone-slate unit which trends across the southern part of Amer Lake and encloses the uranium showings drilled by Aquitaine Company of Canada Limited in 1970 (Laporte 1974a). The western edge of a second belt of similar rocks outcropping to the south was also staked (Fig. IV-15).

During their mapping in 1977 and 1978, Uranerz Exploration and Mining Ltd. geologists subdivided the Amer Group into:

- a basal, clean, white to pink, dense orthoquartzite up to 1,000 m thick which encloses, on the south edge of the basin, a thin bed of quartz pebble conglomerate;
- a buff-weathering dolomite, 20 to 50 m thick, containing numerous quartz veins;
- basic to intermediate volcanic flows, or sills, which enclose dolomite beds, and overlie the orthoquartzite and, locally the dolomite, on the southern edge of the basin;
- 50 m of grey-pink weathering arkosic quartzite locally crossbedded;
- a uranium-bearing phyllitic and pelitic unit consisting mainly of biotite, feldspar amd quartz;
- a massive reddish-weathering arkosic quartzite up to 2,000 m thick which contains local concentrations of magnetite and uraninite, and
- the youngest unit, a white-beige calcareous quartzite with well-developed bedding and crossbedding.

These sediments are folded into an overturned west-plunging synform offset by numerous northwest-trending faults. High angle thrust faulting and a second stage of folding complicate the structure. Granite and granite pegmatite intrude the metasediments in the western part of the area. Diabase and lamprophyre dykes are widely distributed but not abundant within the sequence.

Two types of uranium concentrations were detected. Pitchblende and secondary uranium minerals are found along the reducing biotite- and pyrite-rich horizons of phyllitic metapelites, and uraninite occurs with magnetite in micaschists.

CURRENT WORK AND RESULTS

Geological mapping at a scale of 1:63,360 and helicopter-borne radiometric surveys over most of the claims along lines at 200 m intervals were conducted in 1978. Two grids, established in areas of uranium showings, were explored with magnetometer and, in part, VLF-EM surveys, detailled geological mapping, prospecting and sampling. Two trenches were blasted, mapped and sampled on Grid No.2 which covers the easternmost claims.

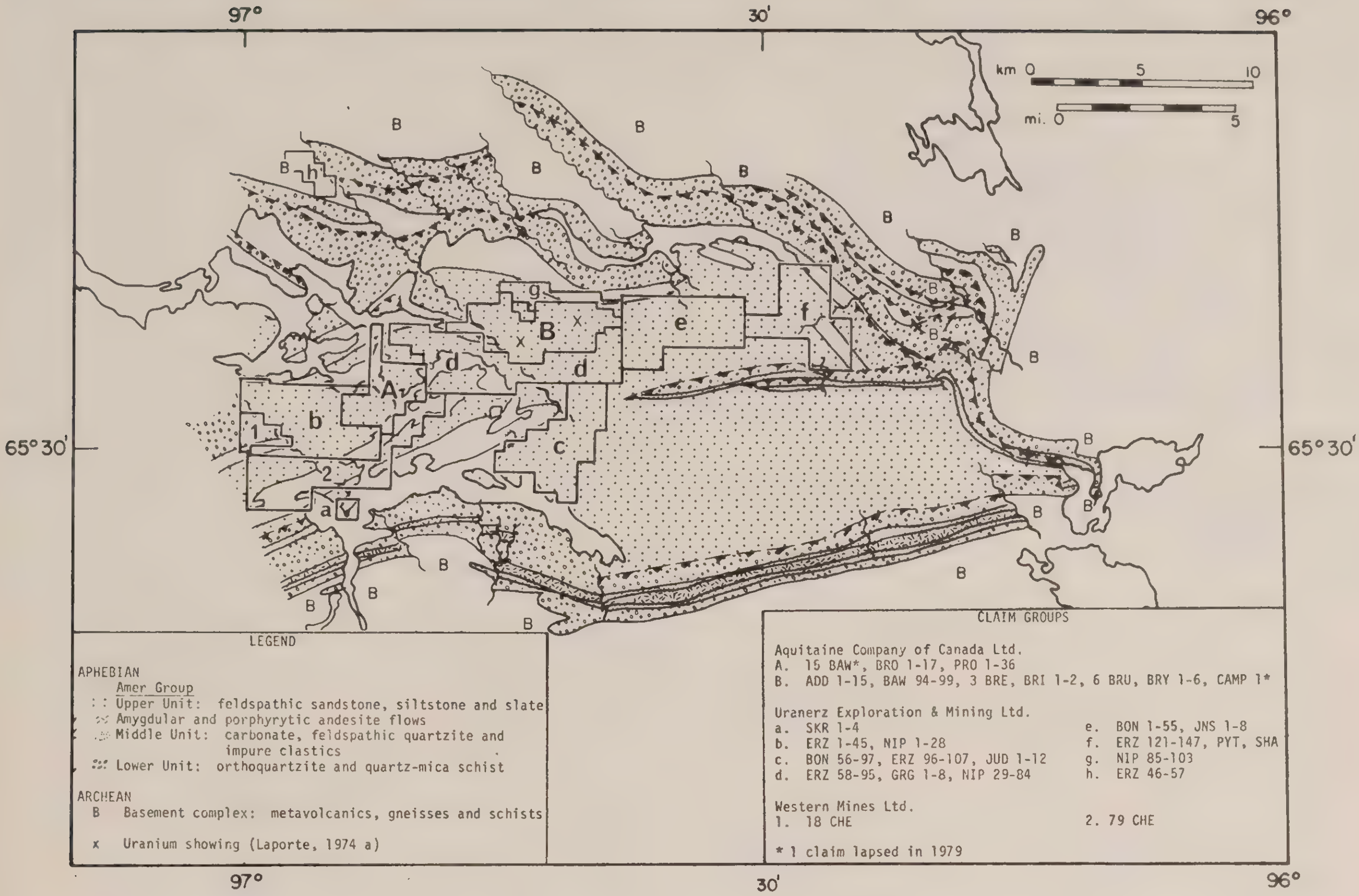


FIGURE IV-15: Geology of the Amer Lake area and location of claims (geology from Patterson, 1980).

Uranium-bearing rocks outcropping on Grid No.1, on the BON 42-45, 52-55 and JNS 1-8 claims, contain up to 1.9% U_3O_8 but the concentrations are discontinuous. On Grid No.2, a continuous uranium-bearing bed was found to contain local concentrations of 1.7% U_3O_8. Samples from a trench blasted across the 1-m thick layer contained an average of 0.30% U_3O_8. Southwest of this showing, a northwest-trending boulder fan contains over 500 radioactive boulders. Samples of 52 of these boulders contained an average of 0.53% U_3O_8 and individual samples contained up to 5.1% U_3O_8.

SOUTHEASTERN MACKENZIE DISTRICT

Walter A. Gibbins
D.I.A.N.D., Geology Office, Yellowknife, N.W.T.

In 1978,the District Geologist for the Arctic Islands Region monitored mineral exploration in the southern and eastern most portions of the District of Mackenzie. The more active areas of this region were the Western Thelon Plain, the Great Slave Plain, Nonacho Lake-Thekulthili Lake and the East Arm of Great Slave Lake. Uranium was the principal exploration target in all of these areas except the Great Slave Plain, where lead-zinc was sought in Paleozoic carbonates.

SCOTT LAKE

PROSPECTING PERMIT 515	Uranium
SCOTT LAKE PROJECT	75 B/1 SW
SMD Mining Co.,	60°07'N, 106°23'W
Saskatoon, Sask.	

REFERENCES

GSC map 37075C (1976); Hoadley (1955).

LOCATION

The permit is centered on the norhwest corner of Scott Lake which straddles the N.W.T.-Saskatchewan border about 480 km southeast of Yellowknife and 130 km northeast of Uranium City.

HISTORY

The Geological Survey of Canada radiometric map for this area (Map 37075C, 1976) shows anomalous radioactivity in the Scott Lake area. In 1977 SMD Mining Co. did a lake sediment survey in the Scott Lake area. The highest values, between 90 to 303 ppm U_3O_8, were found in the permit area between Limit Lake and Scott Lake. Permit 515 adjoins Permit 19 on the Saskatchewan side of the border. This permit is also held by SMD Mining Co.

DESCRIPTION

Glacially derived deposits including several prominant eskers cover 80 to 90 per cent of the permit area. The few scattered outcrops and frost heaves are concentrated in the southern portion of the area and consist mainly of massive to poorly foliated pink granite.

CURRENT WORK AND RESULTS

Airborne radiometric, rock and esker geochemisty and prospecting-geology surveys failed to identify worthwhile targets and the permit was relinquished.

THE WESTERN THELON PLAIN

The Western Thelon Plain includes most of the Thelon River drainage basin within the eastern District of Mackenzie. The northern part of this area lies within the Thelon Game Sanctuary, where mineral exploration has not been permitted. However, the southern part has been intermittently explored for uranium since 1969 (Laporte, 1974a, 1979), despite the fact that it is fairly inaccessible and extensively covered with eskers, drumlins and other glacial features (Craig, 1964).

Sparse outcrops of flat lying Thelon Formation cover most of the area. The Thelon Formation is part of the Helikian (Late Proterozoic) Dubawnt Group and is mostly sandstone (orthoquartzite) with minor pebbly sandstone. Lithic sandstone rich in volcanic debris commonly occurs with a basal conglomerate unit (Donaldson, 1965 and 1969). The Thelon Formation is similar to and possibly correlative with the Athabasca Formation to the south. The Athabaska basin has been the focus of intensive uranium exploration and numerous discoveries have been made (e.g. Dahlkamp, 1978; and Sibald and others, 1976). Normally a regolith is preserved beneath the base of the Thelon Formatin, which lies directly on Archean-Aphebian basement where the Pitz Formation is absent (Table V-1). White quartzite of the Aphebian Hurwitz Group is found northeast of Eyeberry Lake.

The basement rocks are granites and granodiorites separated by belts of metasedimentary and metavolcanic gneisses of Lower Proterozoic age (1.6 to 1.8 b.y.). The latter are considered to be a favourable geological setting for unconformity related uranium deposits of the Key Lake-Rabbit Lake type (Dahlkamp, 1978).

Urangesellschaft Canada Ltd. had a large crew in the Thelon area in 1978. Aquitaine Ltd. and Shell Canada Resources Ltd. had small crews in the area for brief periods.

Table V-1 TABLE OF FORMATIONS IN THE THELON PLAIN AREA

	Fossiliferous limestone
HELIKIAN	Diabase and related dyke rocks
HELIKIAN	DUBAWNT GROUP
HELIKIAN	Dolostone, siliceous dolostone
HELIKIAN	Basalt.
HELIKIAN	THELON FORMATION: conglomerate; pebbly sandstone; sandstone, minor siltstone and mudstone
HELIKIAN	PITZ FORMATION: quartz-feldspar porphyries and associated volcanic rocks
APHEBIAN	HURWITZ GROUP: quartzite; minor siltstone, argillite
APHEBIAN	Granite, granodiorite, and undifferentiated granitoid gneisses

DUBAWNT BASIN PROJECT
Urangesellschaft Canada Ltd.,
3100, 2 Bloor St. East,
Toronto, Ontario M4W 1A8

Uranium
65 L,M; 75 I,P
62°00'N to 63°45'N
102°30'W to 105°30'W

REFERENCES

Donaldson (1965, 1969); Laporte (1974a, 1979, 1980); Wright (1967).

PROPERTY

16 Prospecting Permits listed below.

Permit No.	NTS
370	65-L-4
372	65-L-6
373	65-M-2
379	75-I-1
380	75-I-7
381	75-I-10
382	75-I-15
383	75-P-2
384	75-P-7
457	75-I-2
458	75-I-6
459	75-I-11
460	75-I-14
461	75-I-15
492	75-I-8 SE
493	75-P-3 SE
494	75-P-11 NE
495	75-P-11 NW
496	75-P-11 SE
497	75-P-11 SW

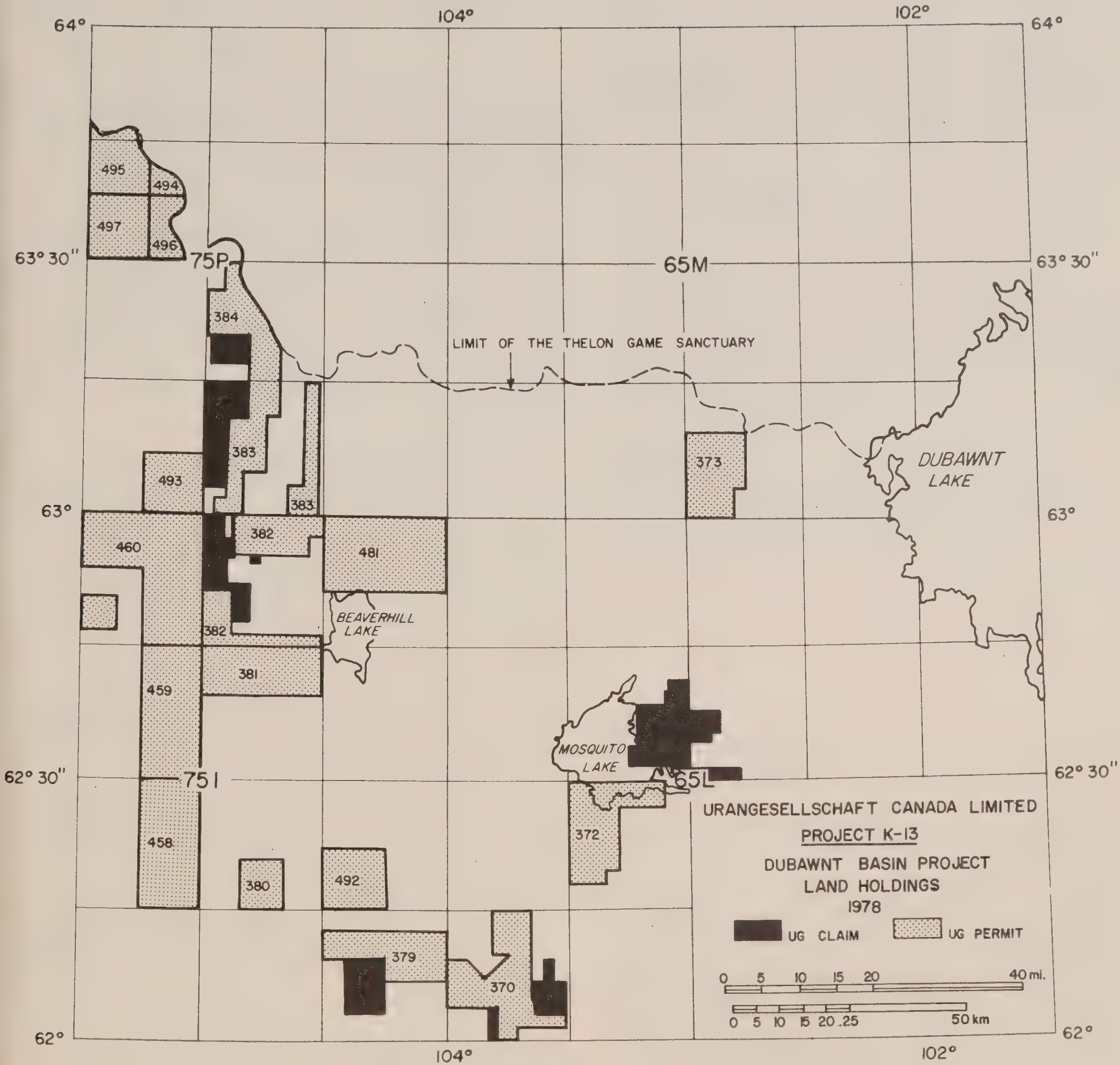


FIGURE V-1: Urangesellschaft Canada Ltd. Claims and permits - Dubawnt Basin Area.

LOCATION

The permits are all located south of the Thelon Game Sanctuary in the Upper Thelon River-Beaverhill Lake-Mosquito Lake area, 560 km east of Yellowknife, N.W.T. (see Fig. V-1). They tend to follow the Thelon Formation-basement contact.

HISTORY

Several permits were acquired and explored in the Thelon area during the uranium boom of 1968 to 1969, however, no significant uranium concentrations were detected (Laporte, 1974a). Urangesellschaft Canada Ltd. did reconnaissance geochemical surveys in 1975 and acquired 10 prospecting permits in 1976, 5 in 1977 and 6 in 1978. Geological, geochemical and radiometric surveys were done in the permit areas (Laporte, 1979, 1980).

DESCRIPTION

The general geology is based on the work of Wright (1967) and is briefly summarized in the introduction to this section. Sandstones of the Helikian Thelon Formation rest unconformably on Archean gneisses, Aphebian granites or, more rarely, on the Pitz Formation.

CURRENT WORK AND RESULTS

A crew of 29 persons explored the permit areas. They were supported by a Hughes 500 helicopter and a float-equipped DCH 3 Otter aircraft.

Reconnaissance included several thousand line-km of airborne magnetometer, VFL-EM and spectrometer surveys and overburden, lake sediment and water sampling in new permit areas near the southeastern Thelon Formation-basement unconformity. Radon in samples was determined in the field and uranium was determined using a Scintrex UA-3 uranium laser analyser at the company's laboratory in Lynn Lake.

Detailed work was done on interesting areas in NTS 75 I/15, P/7 and 65 L/4 and included geology, ground geophysics, alpha cup and alpha meter surveys, an underwater spectrometer survey by scuba divers and a small winkie drill program totalling 138 m in 4 holes. Geological mapping in basement rocks was directed to recognition of favourable metasedimentary units.

Several claim groups were staked to cover areas of lapsing permits.

NONACHO LAKE

The geology of the Nonacho Lake area has been summarized by McGlynn and others (1974), McGlynn (1970b, 1971). Uranium is associated with granitic rocks as pitchblende and allanite, but within the Nonacho Group it occurs mainly as pitchblende in narrow fracture-fillings and small veinlets in quartz stockworks, commonly in deformed rocks.

Mineral exploration in the area has been sporadic for several years. Renewed interest in uranium in 1976 coincided with the release of Geological Survey of Canada Open Files 324, 325 and 326 (Hornbrook and others, 1975) which reported the results of lake sediment geochemical surveys and the release of airborne gamma-ray survey Map 37075G (G.S.C. Uranium Reconnaissance Program, 1976). These results, combined with an earlier airborne radiometric study (Darnly and Grasty, 1972) and promising geology, resulted in considerable staking since 1976.

NONACHO LAKE PROJECT — Uranium
Uranerz Exploration and Mining Limited, — 75 C/13,14; E/1; F/3,4,6,11; K/3
#204, 229-4th Ave. S.,
Saskatoon, Saskatchewan
S7K 5M5

REFERENCES

Gibbins (1982b); Henderson (1939); McGlynn and others (1974); Mulligan and Taylor (1969); Taylor (1971); Stockwell and others (1968).

PROPERTY

SKI 1-35, HILL 1-24, JAM 1-56	75 C/13
MG 1-42, LUB 1014, LAV 1-18,	
YZ 1-287, JIM 1-39, WHY 1, NOT 1	75 C/14
JAYL 1	75 E/1
VIP 1-2, XY 1-80	75 F/6
URY 1-12	75 F/11
BLUE 1-3	75 F/13
TINDA 1	75 K/3

LOCATION

The reconnaissance area, which includes all the claims, covers some 20,000 sq. km (2,000,000 ha) known as the Nonacho Basin. It is centered around Nonacho Lake (Fig. V-2, Uranerz Exploration and Mining Ltd. claims are indicated by the number 2).

HISTORY

Uranerz Exploration and Mining Ltd. began reconnaissance exploration for uranium in the Nonacho Basin in 1977. The contact of the Middle Aphebian Nonacho Group sediments and basement granites and gneisses was the main target. Airborne radiometric surveys, reconnaissance mapping and prospecting and some detailed work was completed in 1977 (Gibbins, 1982b). Several claim groups, staked in the winter of 1977-78, are individually described at the end of this write-up.

DESCRIPTION

Uranerz Exploration and Mining Ltd. geologists have developed the table of formations shown in Table V-2. The basement is composed of fine grained to pegmatitic granitic rocks, granite and paragneisses and diabase. Isolated remnants of what are believed to be Lower Aphebian sediments, possibly related to the Tazin Group metasediments and paragneisses of the Hill Island Lake and Tazin Lake areas to the south, occur in this basement. However, these sediments are tightly folded and extremely sheared making correlations rather dubious.

When not faulted the base of the Nonacho Group sediments is normally a basal conglomerate resting unconformably on the basement. Granite and gneissic boulders predominate at the base.

All units are folded and faulted along a northeast trending direction and at least one mappable cataclastic zone has been recognized in the basement and Lower Aphebian metasediments.

CURRENT WORK AND RESULTS

In 1978, Uranerz Exploration and Mining Ltd.'s exploration team completed their reconnaissance survey of the Nonacho Basin and discovered, staked and examined several areas of uranium mineralization.

Questor Surveys Ltd. were contracted to do airborne Input EM and magnetic surveys and Sander Geophysics Ltd. to do airborne VLF-EM and magnetic surveys over the XY and XZ claims. Ground Max Min II EM and magnetic surveys were also done on these claims

and the URY and SKI-HILL claims. The EM work indicated that good conductors do not exist in the areas surveyed and those conductors that exist can be related to conductive lake bottoms, swamps, etc. The magnetometer surveys are useful as an aid to mapping geology, but do not outline zones of uranium mineralization.

Detailed surficial and bedrock studies, soil geochemistry, trenching and sampling were done near showings on the various claim groups. A few minor showings of chalcopyrite also occur in the area.

The results of the 1977-78 field work are considered encouraging and more work is planned.

Table V-2: TABLE OF FORMATIONS OF THE NONACHO LAKE AREA

HELIKIAN	LOWER	DIABASE	
		Intrusive Contact	
APHEBIAN	UPPER MIDDLE	Nonacho Group	basal conglomerate, arkosic quartzote and minor shale
		Angular unconformity	
		CATACLASTIC ZONE	Chloritic Cataclastics and banded Mylonite
	LOWER	Black shale, brown-green phyllite, white-green quartzite	
		Angular unconformity	
ARCHEAN		Hornblende granite (in part pegmatite)	
		Intrusive Contact	
		Granitic and para-gneisses and minor diabase	

SKI AND HILL CLAIMS — Uranium — 75 C/13 — 60°57'30"N, 109°45'W

PROPERTY

SKI 1-35 and HILL 1-24

LOCATION

The claims are about 15 km east of the south end of Thekulthili Lake, A in Figure V-2.

DESCRIPTION

The Ski Hill basin is a small outlier of Nonacho quartzite. Basement rocks are biotite gneiss intruded by biotite granite.

CURRENT WORK AND RESULTS

Pitchblende grains are disseminated in calcareous sandstone and in tiny fractures in basement rocks.

XZ, MG, LAV AND LUB CLAIMS - MOSQUITO GULCH — Uranium — 75 C/14 — 60°58'N, 109°20'W

PROPERTY

XZ 1-127, MG 1-42, LAV 1-1 and LUB 1-14.

LOCATION

The claims are south of the southwest arm of Powder Lake, B in Figure V-2.

DESCRIPTION

The claims include part of a Nonacho Group outlier, however, the actual Nonacho-basement contact is not exposed. In 1977, a major radioactive boulder train was found in the Mosquito Gulch area and the area was mapped in detail.

CURRENT WORK AND RESULTS

A single trench exposed breccia and mylonite with high radioactivity, but this is not believed to be the main zone.

Geophysical and soil geochemical surveys were done in 1978 to test the methods and outline drill targets. The soil geochemistry has outlined one new radioactive area. Drilling is planned in 1979.

Uranium appears to be concentrated in fault zones in the basement, which are perpendicular to the Nonacho basement contact.

JAM CLAIMS - KIDDER LAKE — Uranium — 75 C/14 — 60°57'N, 109°18'W

PROPERTY

JAM 1-56

LOCATION

The JAM claims cover the north part of Kidder Lake. They are about 10 km south of the southwest portion of Powder Lake and adjoin the MG claims to the north, C in Figure V-2.

The Kidder Lake prospect is about 3 km south of Mosquito Gulch.

DESCRIPTION

The area is underlain by basement similar to that in the Mosquito Gulch area.

CURRENT WORK AND RESULTS

A small source of frost-heaved boulders was located.

JAYL 1 CLAIM - JEROME LAKE — Uranium — 75 E/1 — 61°04'N, 110°22'W

REFERENCES

McGlynn (1978)

PROPERTY

JAYL 1

LOCATION

Jayl 1 is about 7 km east of King Lake and 7 km southwest of Jerome Lake, D in Figure V-2.

DESCRIPTION

Feldspar porphyry with high radioactivity intrudes Nonacho Group sediments. The area was remapped by McGlynn, 1978 (G.S.C. Open File 543).

CURRENT WORK AND RESULTS

Two high grade uranium showings were located and staked in 1978.

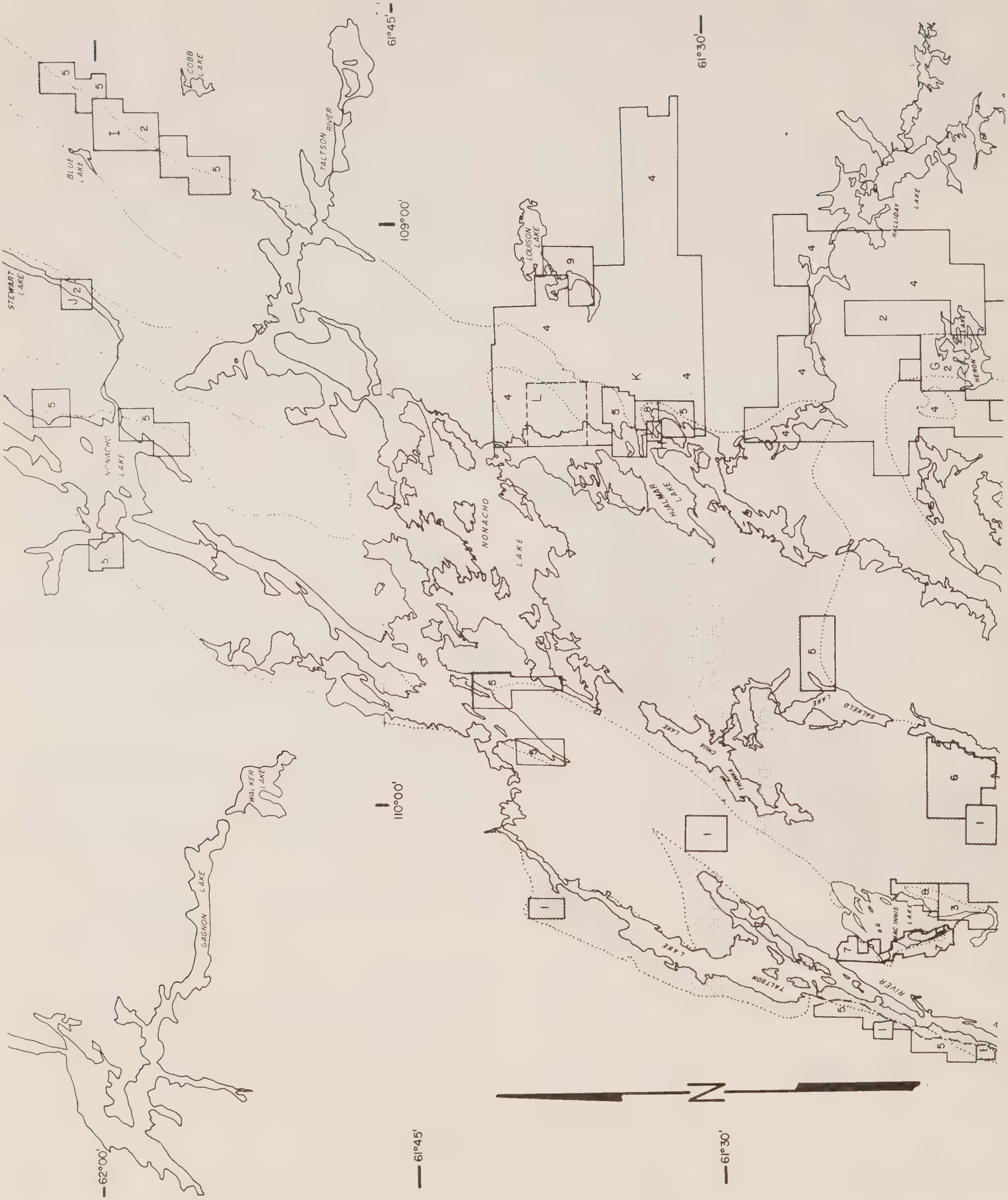
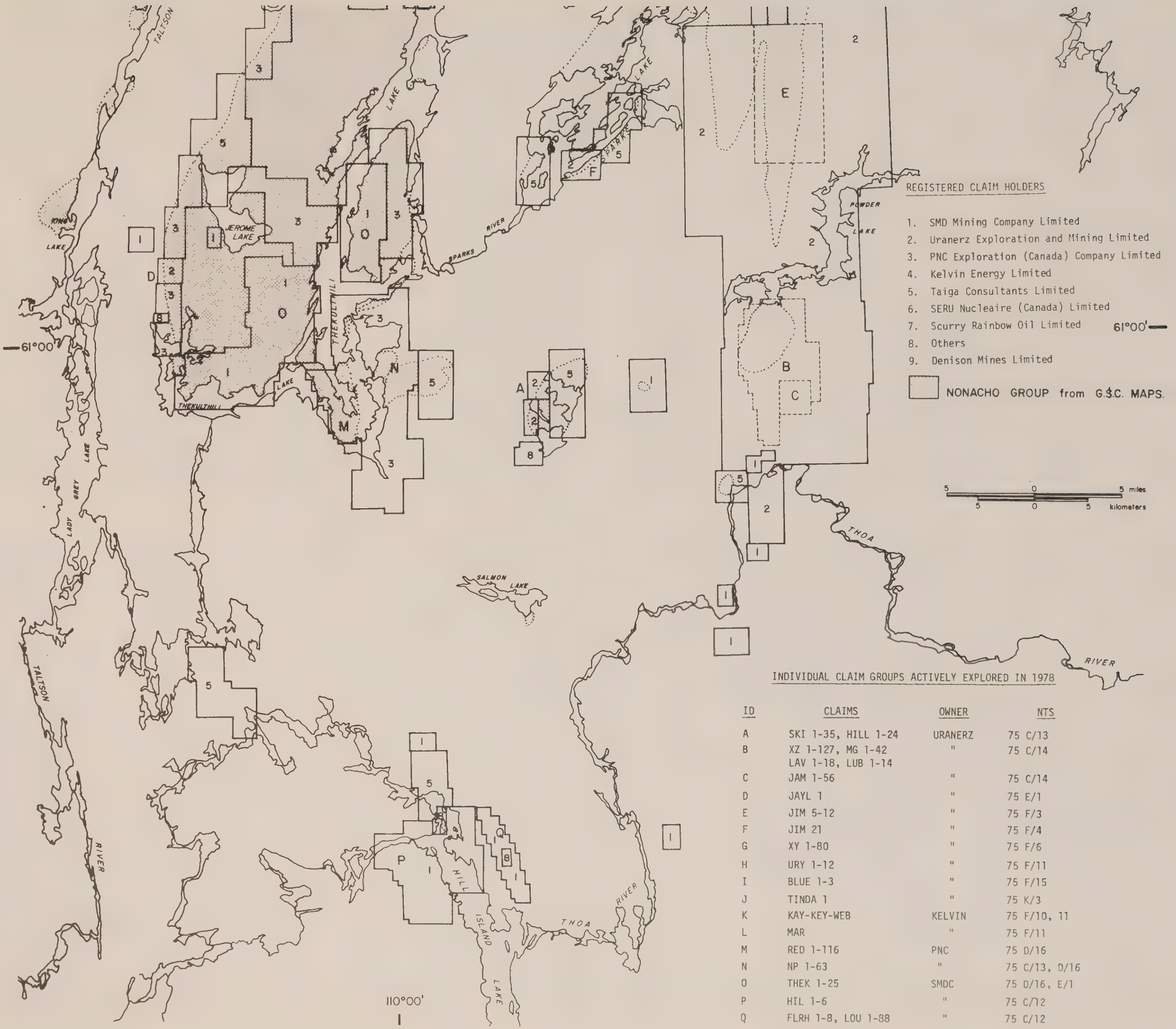


FIGURE V-2: *Claim Ownership - Nonacho Lake Area.*



REGISTERED CLAIM HOLDERS

1. SMD Mining Company Limited
2. Uranerz Exploration and Mining Limited
3. PNC Exploration (Canada) Company Limited
4. Kelvin Energy Limited
5. Taiga Consultants Limited
6. SERU Nucleaire (Canada) Limited
7. Scurry Rainbow Oil Limited
8. Others
9. Denison Mines Limited

NONACHO GROUP from G.S.C. MAPS.

INDIVIDUAL CLAIM GROUPS ACTIVELY EXPLORED IN 1978

ID	CLAIMS	OWNER	NTS
A	SKI 1-35, HILL 1-24	URANERZ	75 C/13
B	XZ 1-127, MG 1-42 LAV 1-18, LUB 1-14	"	75 C/14
C	JAM 1-56	"	75 C/14
D	JAYL 1	"	75 E/1
E	JIM 5-12	"	75 F/3
F	JIM 21	"	75 F/4
G	XY 1-80	"	75 F/6
H	URY 1-12	"	75 F/11
I	BLUE 1-3	"	75 F/15
J	TINDA 1	"	75 K/3
K	KAY-KEY-WEB	KELVIN	75 F/10, 11
L	MAR	"	75 F/11
M	RED 1-116	PNC	75 D/16
N	NP 1-63	"	75 C/13, D/16
O	THEK 1-25	SMDC	75 D/16, E/1
P	HIL 1-6	"	75 C/12
Q	FLRH 1-8, LOU 1-88	"	75 C/12

JIM 5-12 CLAIMS

Uranium
75 F/3
$61^{\circ}12'$N, $109^{\circ}18'$W

REFERENCES

Taylor (1971)

PROPERTY

JIM 5-12

LOCATION

The JIM 5-12 are from 3 to 15 km south of the western end of Heron Lake, E in Figure V-2.

DESCRIPTION

The Nonacho Group-basement contact trends northerly along the length of the claim group (Taylor, 1971). The area appears to have undergone intense intrusive and hydrothermal activity.

CURRENT WORK AND RESULTS

A number of radioactive showings and boulders of chloritized metasediment were located. The mineralization appears to be spotty.

JIM 21 CLAIM - SPARKS LAKE

Uranium
75 F/4
$61^{\circ}09'$N, $109^{\circ}41'$W

PROPERTY

JIM 21

LOCATION

The JIM 21 claim is centered on the southeast shore of Sparks Lake, F in Figure V-2.

DESCRIPTION

During 1977 uranium was discovered at the contact between Nonacho arkose and the underlying basement rocks.

CURRENT WORK AND RESULTS

Five trenches revealed fracture controlled sub-economic uranium mineralization associated with hematite and chlorite.

XY CLAIMS - HERON LAKE

Uranium
75 F/6
$61^{\circ}19'$N, $109^{\circ}15'$W

PROPERTY

XY 1-80

LOCATION

The XY claims are just north of Heron Lake, G in Figure V-2.

DESCRIPTION

The area is underlain by basement gneisses; Nonacho sediments lie to the west.

CURRENT WORK AND RESULTS

Radioactivity is located within a shear zone northeast of and parallel to a diabase dyke. Forty cubic metres were blasted from three trenches. Radioactivity is associated with fault gouge, chloritized or hematized gneiss, and breccia (least).

Detailed geological and geophysical mapping were done.

URY CLAIMS - C.O. ISLAND

Uranium
75 F/11
$61^{\circ}32'30''$N, $109^{\circ}18'$W

PROPERTY

URY 1-12

LOCATION

The URY claims are on the east side of Hjalmar Lake and include the north part of a prominent island unofficially called C.O. Island, H in Figure V-2.

DESCRIPTION

The area is underlain by folded Nonacho conglomerate and arkose.

CURRENT WORK AND RESULTS

Radioactivity was found in narrow fractures in arkose and argillite. Associated hematite and anhydrite suggest a hydrothermal origin.

BLUE CLAIMS - BLUE LAKE

Uranium
75 F/15
$61^{\circ}58'$N, $108^{\circ}50'$W

PROPERTY

BLUE 1-3

LOCATION

The claims are centered on Blue Lake, a small lake about 7 km northwest of Cobb Lake, I in Figure V-2.

DESCRIPTION

The claims cover part of the Nonacho-basement contact which is probably under the lake. Radioactive basement boulders were discovered in 1977.

CURRENT WORK AND RESULTS

A fan of over 100 radioactive boulders was outlined to determine the source area.

TINDA CLAIM - STEWART LAKE

Uranium
75 K/3
61°

PROPERTY

TINDA 1

LOCATION

This claim is on the south central part of Stewart Lake, J in Figure V-2.

DESCRIPTION

The area is underlain by clastic sediments of the Nonacho Group. A major northeast lineament runs through Stewart Lake.

CURRENT WORK AND RESULTS

A radioactive boulder was discovered in 1978.

THEKULTHILI LAKE PROJECT
RED, NP and KULT CLAIMS
PNC Exploration (Canada) Co. Ltd.,
3060-650 W. Georgia St.,
Box 11571, Vancouver Centre,
Vancouver, B.C., V6B 4N8.

Uranium
75 C/13, D/16
$60^{\circ}58'$N, $110^{\circ}00'$W

REFERENCES

Donaghy (1977); Henderson (1939); McGlynn (1966, 1978); Mulligan and Taylor (1969); Taylor

(1971); Wilson (1941).

PROPERTY

RED 1-116, NP 1-63, KULT 12 (RED = M and NP = N in Figure V-2).

LOCATION

The claims cover most of the Nonacho Group-Basement unconformity in the southeast Thekulthili Lake area, about 30 km southeast of Yellowknife and 160 km north of Fort Smith.

HISTORY

In 1977 PNC Exploration carried out an airborne radiometric survey over the southern Nonacho Basin. The RED and NP claims were staked to protect anomalies detected by this survey.

DESCRIPTION

The oldest rocks in the Thekulthili Lake area, basement granites and gneisses of Archean to Aphebian age, are unconformably overlain by conglomerate, arkose and argillite units of the Nonacho Group of undefined Proterozoic age. The Nonacho and basement rocks have been faulted and folded along north-northeast trends. The youngest rocks are undeformed diabase dykes.

The area is at the mutual corners of geological maps by Henderson (1939a), Mulligan and Taylor (1969), Taylor (1971) and Wilson (1969). McGlynn (1966 and 1978) mapped part of the claim area in detail and Donaghy (1971) reviewed the geology of the Thekulthili Lake area.

CURRENT WORK AND RESULTS

Work on the claims included lake sediment and airborne radiometric surveys, geological mapping and prospecting. Anomalous areas were selected for detailed mapping and soil sampling; they appear to be related to uranium-thorium bearing sandstone clasts in Nonacho conglomerate and uranium related to fracturing.

Reconnaissance radiometric and lake sediment surveys over adjacent areas led to the staking of several additional claims.

HILL-NONACHO PROJECT	Uranium
SMD Mining Co. Ltd.,	75 C, D & E
122-3rd Avenue North,	60^{o}-$61^{o}30$'N,
Saskatoon,	109^{o}-$111^{o}30$W
Saskatchewan, S7K 2H6	

REFERENCES

Alcock (1935); Darnley & Grasty (1972); Gandhi and Prasad (1980); Gibbins (1979); Henderson (1939); Hornbrook and others (1976); McGlynn and others (1974); McGlynn (1970b, 1978); Mulligan and Taylor (1969); Patterson and others (1979); Wilson (1941).

PROPERTY

FLRH 1-8; LOU 1-88, CD 1-19, 38, 39 ; AB 1-6; TATS, INN, KING JER; TALT-E TALT-S, TALT-W, TALT-NE,THOA 1-8, HIL, HIL 1-6, TAZIN 1-3 and THEK 1-25 (see Figure V-3).

LOCATION

SMD Mining Ltd.'s claims and exploration have been concentrated around the southern part of Thekulthili Lake and Hill Island lake (O, P and Q in Figure V-2 and Figure V-3) about 125 km east-northeast of Fort Smith, N.W.T.

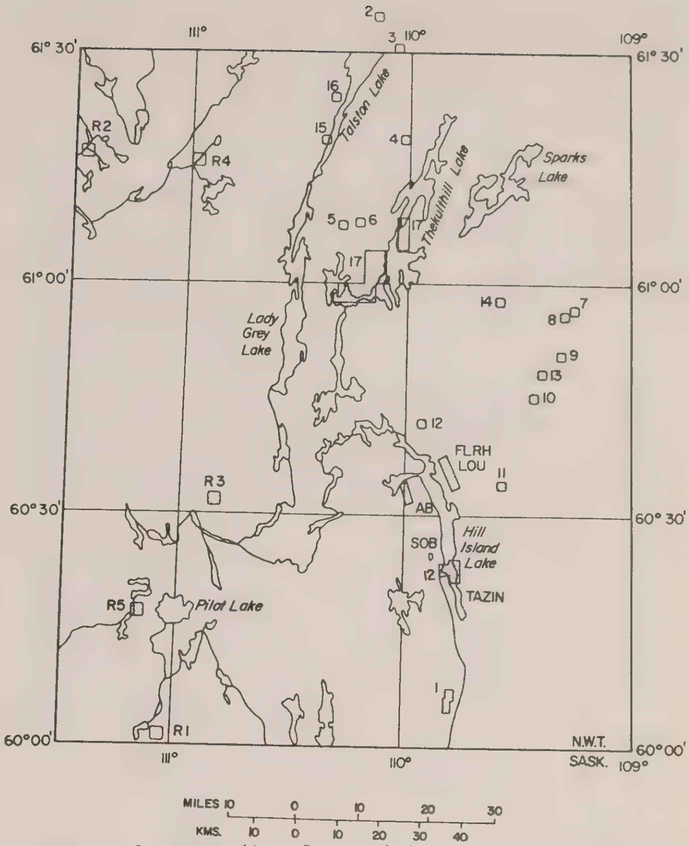


FIGURE V-3: Location of SMD Mining Co. Ltd. claims, Hill Island-Nonacho Project and Talston Project.

1 TATS, CD	*10 THOA 4*	*(1977)*
2 TALT N	*11 THOA 5*	
3 TALT E	*12 HIL*	*R1 - R5*
4 INN	*13 THOA 6*	
5 KING	*14 THOA 7,8*	
6 JER	*15 TALT S*	
7 THOA 1	*16 TALT W*	
8 THOA 2	*17 THEK 1-25*	
9 THOA 3		

HISTORY

In 1976, following the publication of government airborne radiometric surveys, SMD Mining Ltd. staked several small claim groups west of Thekulthili Lake (Gibbins, 1979). These claims were of little interest and have been allowed to lapse.

In 1976 the FLRH 1-8 claims at Quench Lake (Q just east of Northern Hill Island in Figure V-2) were optioned from prospectors Fred and Sandy Loutitt of Uranium City and 88 LOU claims were staked adjacent to the FLRH claims. Detailed work in 1977 included VLF-EM, magnetometer and geological mapping soil geochemistry, boulder tracing and trenching. Assays as high as 0.5% U_3O_8 were obtained but the showings are small and lensy (Gibbins, 1979).

Regional work in 1977 consisted of helicopter-

radiometric and lake sediment sampling over 1,000 km^2 and 5,100 km^2 respectively. During the winter of 1977-78, 22 claim blocks were staked on the basis of lake sediment results. Additional claims were staked in the summer and fall of 1978.

DESCRIPTION

The Nonacho Lake-Hill Island Lake area has been mapped at a scale of 1;250,000 (Henderson, 1939; Mulligan and Taylor, 1969; Taylor, 1971 and Wilson, 1941). McGlynn (1978) published detailed maps of Thekulthili Lake. Various magnetic and radiometric maps (e.g. Darnley and Grasty, 1972) and geochemical maps (e.g. Hornbrook and others, 1976) are available.

Thekulthili Lake is at the south end of the Aphebian Nonacho Basin (McGlynn and others, 1974; McGlynn, 1970b, 1978). Older metasediments and gneisses of the Tazin Group in the Hill Island Lake area continue south into Northern Saskatchewan (Alcock, 1935).

CURRENT WORK AND RESULTS

The 1978 Hill-Nonacho project consisted of regional exploration within the project area and evaluation of claims staked as a result of the 1977 lake sediment surveys. The 1978 work comprised 3,000 line km of helicopter radiometric survey, 756 km of Questor input EM and magnetometer survey, additional lake sediment sampling, reconnaissance prospecting and mapping on 22 claims, detailed ground surveys on the THEK claims, underwater geophysical surveys at Hill Island and Quench Lakes and additional claim staking.

Disseminated and fracture controlled mineralization was found in Nonacho Group arkoses and conglomerates near the unconformity with basement rocks. This sub-economic mineralization is associated with a shear zone.

Several hundred areas of anomalous radioactivity were discovered by a helicopter radiometric survey. About 150 were considered important enough to evaluate on the basis of geology.

Several hundred lake sediment samples were collected and analyzed for U, Cu, Ni, Zn and Pb. Several anomalies were related to linear features or shear zones.

A Questor Input EM survey was mainly confined to a narrow north trending strip of Tazin Group metasediments that extend from northern Hill Island Lake south to latitude 60°N. Several conductive zones were identified and most of these were ground checked. Carbonaceous shales were found in one locality, but no anamalous radioactivity was detected.

It is believed that the survey was designed to identify graphite conductors in the hope that the graphite-uranium relationshp that exists in both the Key Lake and Rabbit Lake area (Patterson and others, 1979) would apply in this area.

A seismic and underwater radiometric survey of Quench Lake (FLRH and LOU claims, Q in Figure V-2) and northern Hill Island Lake (HIL claims, P in Figure V-3) was done by dragging a water proof radiometric sensor along the lake bottom and continuously recording U, Th, K and total counts.

Radiometric data obtained from Quench Lake is incomplete and poor quality, in part due to equipment breakdowns and the pronounced hydrographic relief. However, anomalous values were obtained at the south end of the lake. A couple of anomalous areas were recognized in Northern Hill Island Lake. The largest of these is, spatially at least, related to islands of siliceous metasediments.

As a result of the 1977 lake sediment survey 22 claims were staked. In 1978, a helicopter radiometric survey and ground checks were done over these claims. The results are summarized in Table V-3 and locations are shown in Figure V-3.

THEK CLAIMS	Uranium, Lead
SMD Mining Co. Ltd.,	75 D/16, E/1
122-3rd Avenue North,	61°00' 110°15'W
Saskatoon,	
Saskatchewan, S7K 2H6	

REFERENCES

Bostock (1980); Gandhi and Prasad (1980); Henderson (1939); McGlynn (1978); McGylnn and others (1974); Wilson (1941).

PROPERTY

THEK 1-25

LOCATION

The THEK claims are adjacent to southern and western Thekulthili Lake (O in Figure V-2) and Figure V-3). This is about 125 km east-northeast of Fort Smith, N.W.T.

HISTORY

The claims were staked as a result of a 1977 regional lake sediment survey and subsequent ground work.

DESCRIPTION

The claims cover most of the southwestern tip of the Nonacho Basin (McGlynn and others, 1974). This area was originally mapped by Henderson (1939) and Wilson (1941). McGlynn (1978) and Bostock (1980) have remapped parts of the Thekulthili Lake area.

A distinctive conglomerate breccia containing abundant blocks of gneiss is commonly present at the base of the Nonacho Group in the Thekulthili Lake area (Bostock, 1980). Higher within the group the rocks are predominantly granite pebble conglomerate, arkosic sandstones and siltstone. Current directions indicate that the source of sediment was to the southwest. Basement rocks include granitic rocks, meta-arkose and meta-greywacke. Dips of the Nonacho Group are variable and the structure complex.

Most of the southwestern part of the THEK claims is covered with muskeg.

CURRENT WORK AND RESULTS

Following reconnaissance lake sediment and helicopter radiometric surveys, claim staking and ground examinations were carried out in areas with high uranium counts and/or U/Th greater than 0.5. During this work the claims were geologically mapped, six uranium showings were stripped and trenched and numerous minor showings and radioactive boulders were discovered. Many of these showings appear to be related to lineaments, which can be recognized on air photographs and aeromagnetic maps.

Most of the ground work was done on the THEK 4 and 7 claims (61°01'N, 110°10'W) on the "INOMI" grid, over a northeast trending zone of pyrite-rich sheared

TABLE V-3. Results of Reconnaissance Claim Evaluation, SMD Mining Co. Ltd.

THOA 1	75 C/14	60°55'N, 109°20'W	U and Pb anomalies, no explanation
THOA 2	75 C/14	60°54'N, 109°23'W	U, Cu and Pb anomalies, on Tazin Group, basement unconformity, high in surrounding granites?
THOA 3	75 C/14	60°49'N, 109°23'W	High U, Tazin metasediments, no explantaion
THOA 4	75 C/11	60°49'N, 109°25'W	High U GSC Open File 324, high radioactivity in pegmatite outcrop
THOA 5	75 C/12	60°35'N, 109°31'W	High U (Zn + Pb), high RA background in metasediments
THOA 6	75 C/14	60°25'N, 109°25'W	High U, Tazin Group, no explanation
THOA 7,8	75 C/13	60°57'N, 109°34'W	High U, Nonacho, basement unconformity, no anomalous RA
TALT S	75 E/8	61°27'N, 110°25'W	High U, no explanation
TALT W	75 E/8	61°22'N, 110°25'W	Strongly anomalous lake sediment, Nonacho Group, basement unconformity, high but spotty RA in pegmatite
KING	75 E/8	61°05'N, 110°25'W	Strong U anomalies, intersection of prominent linements, soil survey, no explanation
TALT E, TALT NE	75 E/8	61°31'N, 110°25'W	High U, shear zone Yellow U stains in old trenches, pegmatite and sulphide observed
TALT N	75 E/9	61°39'N, 110°02'W	Anomalous, no explanation
INN 75 D/8		61°17'N, 110°02'W	High U, Nonacho Group, no explanation
CD, TATS	75 C/4	60°06'N, 109°46'W	Geochemical and Input anomalies, U bearing pegmatites

radioactive rocks with traces of graphite. Extensions of this zone were delineated by IP and VLF-EM surveys. Radon emanometer and track etch surveys correlated well with each other but not with uranium in soils which tends to be low.

Uranium mineralization is in two forms. The first type is disseminated uraninite in arkose, associated with hematized feldspar. The second type is fracture controlled and may be associated with clay minerals in open brecciated fractures in conglomerate or with calcite and hematite in well defined fractures in arkose.

A galena showing on the south shore of Thekulthili Lake at 60°58'N, 110°15.5' W (Gandhi and Prasad, 1980) was examined and sampled. A representative grab sample contained 0.5 U, 440 Cu, 84,800 Pb, 21400 Zn and 104 Ag (all in ppm).

LOUISON LAKE PROJECT	Uranium
KAY, KEE, WEB CLAIMS	75 F/10, 11
Kelvin Energy Ltd.,	61°32'-61°39'N,
6th Floor, 706 7th Avenue, S.W.	108°45'-109°22'W
Calgary, Alta., T2P 0Z1	

REFERENCES

Henderson (1939); Hornbrook and others (1976); Taylor (1971).

PROPERTY

WEB 1-5, KEE 1-27, and 40 KAY claims.

LOCATION

The claims are east of Hjalmar Lake and south and west of Louison Lake in the Nonacho Lake area 300 km east-southeast of Yellowknife (K in Figure V-2 and Figure V-4).

HISTORY

The KAY claims were staked by New Continental Oil of Canada Ltd. in 1968, radioactive syenite float was discovered during ground follow-up of an airborne radiometric survey.

In 1969 and 1970 Canadian Superior Exploration Ltd. mapped, prospected and drilled (16 holes - 1,900 m) radioactive anomalies in the vicinity of 'Jo Lake' (3.5 km east of Hjalmar Lake and 8.5 km southwest of Louison Lake - Figure V-4). Geologists discovered numerous radioactive boulders of syenite along the north shore of the east arm of Jo Lake. These were thought to be near their bedrock source but it was not located. Drilling and trenching encountered small areas of disseminated pitchblende and small fractures coated with uranophane: the highest assays were 0.238% U_3O_8 from a boulder and 0.165% $U3O_8$ over 12 inches from a trench on KAY 17. At Jo Lake drill holes 8 and 9 intersected chlorite-potash feldspar rich rock similar to radioactive boulders found on the surface.

In 1978 Kelvin Energy Ltd. optioned the KAY claims from Pan Ocean Ltd. and staked the KEE and WEB claims.

DESCRIPTION

The geology of the area has been mapped by Henderson (1939) and Taylor (1971) as granite and related rocks. The area is immediately east of the Nonacho Sedimentary Basin and is underlain by block-faulted Aphebian gneisses and granite. Mapping by company geologists has defined a West Granite Pluton and an East Granite Pluton surrounded and separated by a series of biotite-quartz-feldspar gneisses and smaller granite bodies. The regional structural trend is to the northeast with numerous local variations. The regional setting is comparable to the Beaverlodge district to the south.

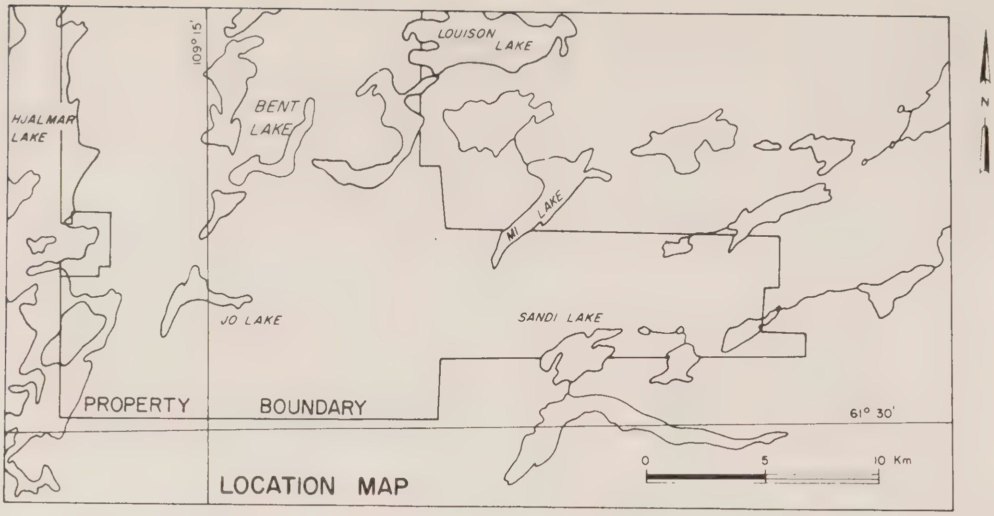


FIGURE V-4: Louison Lake-Jo Lake-Brent Lake claims of Kelvin Energy Ltd.

Glacial materials vary from zero to more than 30 m thick and include sand dunes, till, boulder fields and eskers derived from the northeast.

CURRENT WORK AND RESULTS

MPH Consulting Ltd. did geophysical, geochemical and geological surveys for Kelvin Energy Ltd. in 1978. A surficial geology study of the Jo Lake area was done by Bayrock Surficial Geology Ltd. A reconnaissance lake sediment survey (635 samples) confirmed an earlier GSC uranium anomaly at Jo Lake (Hornbrook and others, 1976) and outlined several additional anomalies.

A detailed magnetic survey defined an anomaly in the vicinity of the Jo Lake boulder field and showed that the Jo Lake-Bent Lake shear zone is marked by a deflection of magnetic trends. A VLF-EM survey failed to identify significant conductors.

Soil chemistry and soil gas surveys gave the best results on the north shore of Jo Lake in the vicinity of Canadian Superior Oil Ltd.'s 1969 drilling.

An airborne geophysical survey of the KEE and WEB claims by Kenting Earth Sciences Ltd. suggests that geology is more complex than shown on existing government geological maps. No bedrock EM conductors were detected, but there is considerable anomalous radioactivity within the area. Two areas of high U/Th ratios are recommended for ground investigation.

The best uranium potential occurs within an area of shearing, alteration and retrograde metamorphism, the Jo Lake-Bent Lake shear zone , in the west portion of the property.

THE GREAT SLAVE PLAIN

The Great Slave Plain is that part of the Interior Plains between latitudes 60 and 64°N, and between the Franklin Mountains and the western edge of the Precambrian Shield in the vicinity of Great Slave Lake. It is underlain mainly by Paleozoic carbonates, and has a relatively flat topographic surface, generally less than 300 m in elevation, that is characterized by sparse outcrop, abundant swamp and, locally, by sinkholes and karst topography. The Horn Plateau, which consists of Mesozoic strata, is a broad smooth upland rising to 750 m.

The Great Slave Plain includes the Pine Point Lead Zinc District, the source of more than two thirds of the Northwest Territories annual production of mineral wealth. Because of extensive overburden, the flat-lying attitude of the host rocks, and the nature of Pine Point type mineralization, exploration is mainly by IP surveys (Lajoie and Klein, 1979) and fence or grid drilling. Attempts to locate mineralization using rock and soil geochemistry, gravity and EM surveys have not been very successful. Most work is done in the winter when the widespread swamps and muskegs are frozen.

Pine Point Mines Ltd. (see page 14, Chapter II), the only producer in the area, employs several hundred people, mills about 4 million tons each year and spends nearly 2 millon dollars each year exploring its extensive mineral holdings. Because most of this exploration is on mineral leases, the results are not normally reported as assessment work and rarely becomes available. Their 1978 budget for continued geophysical work (455 km of IP) and diamond drilling (35,850 m) on the property was $1.5 million.

GREAT SLAVE REEF AND WEST REEF PROJECTS — Lead, Zinc
Western Mines Ltd., — 85 B/11-14
1103-595, Burrard Street, — 60°45'N, 115°10'W
Vancouver, B.C., V7X 1C4.

REFERENCES

Douglas and Norris (1974); Gibbins (1978b, 1979b); Norris (1965); Skall (1975).

PROPERTY

1,300 AX, 1,306 WD, 73 GSR, 218 BES and 12 MR claims.

LOCATION

The AX group or Great Slave Reef Project covers a 16 by 16 km area, straddling N.W.T. Highway 5 between the Buffalo River and Pine Point Ltd. holdings on the east and Birch Creek on the west. The adjacent WD claims form a block 9.6 km wide by 25 km long between Birch Creek and Hay River. Exploration on these claims constitutes the West Reef Project (Figure V-6).

HISTORY

Most of the area was staked between 1965 and 1967, however, the favorable stratigraphic units are too deep to have been tested by conventional geophysics of that time and little exploration was done.

During March and April, 1975, Western Mines Ltd. acquired the AX claims and entered a joint venture with Dupont of Canada Exploration Ltd. to explore them. The WD and GSR claims were staked early in 1976 and BES in 1977.

Between November, 1975 and April, 1976, over 12,800 m were drilled in 72 holes on the AX group. During 1976, 130 holes, totalling 32,004 m were completed and the X-25 deposit was discovered and partly delineated. Reconnaissance drilling traced the main reef (Presqu'ile Formation) at depths of 137 to 220 m over the entire 42 km strike length staked by Western Mines Ltd. (Gibbins, 1979b).

Diamond drilling (17,347 m in 1976) resulted in expansion of reserves of the X-25 Zone and in the discovery of two additional mineralized zones. Drill-indicated reserves of the X-25 Zone were revised to 3.8 million tons grading 3.3% lead and 9.1% zinc.

Significant intersections are given in previous Mineral Industry Reports (Gibbins, 1978b, 1979b).

DESCRIPTION

The 'Main Hinge Zone', along which many of the mineral deposits in the Pine Point District lie (Fig. 2 of Skall, 1975), extends westward across the AX and WD claims at a depth of 100-200 m. This zone corresponds closely to the Devonian Pine Point barrier reef complex which passes into time equivalent evaporites (Muskeg Formation) and tidal flat deposits (J Facies of Skall, 1975) to the south, and deep water shales to the north. Outlining the reef complex now largely altered to coarse grained dolomite known as Presqu'ile Facies, was the initial exploration goal.

According to Skall (1975), penecontemporaneous faults or hinge zones were instrumental in barrier complex facies development. These faults remained lines of weakness and zones of intermittent movements and were enhanced during paleokarst development. They served as conduits for magnesium rich brines which formed the Presqu'ile dolomite and localized lead-zinc deposition.

CURRENT WORK AND RESULTS

Early in 1978, the V-46 zone was indentified 2,000 feet northeast of X-25 and estimated to contain 600,000 tons of 8% combined lead-zinc. Late in 1978 drilling around a narrow intercept of lead-zinc in drill hole 190 (14,000 feet west of X-25) discovered the R-190 Zone. Results of this drilling are shown in Figure V-5 and Table V-4. Preliminary calculations indicate this zone contains approximately 1,000,000 tons grading 6.2% Pb and 11.9% Zn.

Diamond drilling in 1978 totalled 18,850 m on both properties. In addition, approximately 160 line km of I.P. surveys defined several anomalies, some of which were tested with diamond drilling.

A pump test was completed on the X-25 Zone to determine the dewatering and recharge characteristics of the zone.

TABLE V-4: DRILLING RESULTS R-190 ZONE

Hole	From-To	Length ft.	% Lead	% Zinc
332	435-453	18	3.10	0.08
	453-470	17	0.60	0.03
	470-551	81	9.40	19.50
333	Barren			
334	Barren			
335	470-549	79	1.32	6.83
336	358-428	70	1.70	1.00
	428-446	18	10.58	0.47
	446-477	31	0.98	0.14
	447-560	83	19.74	17.26
337	Barren			
338	453-505	52	8.47	11.17
339	Barren to weakly mineralized			
348	540-556	16	0.1	2.87
349	481-563	82	0.99	4.03
	596-608	12	0.56	4.38

R-190 ZONE

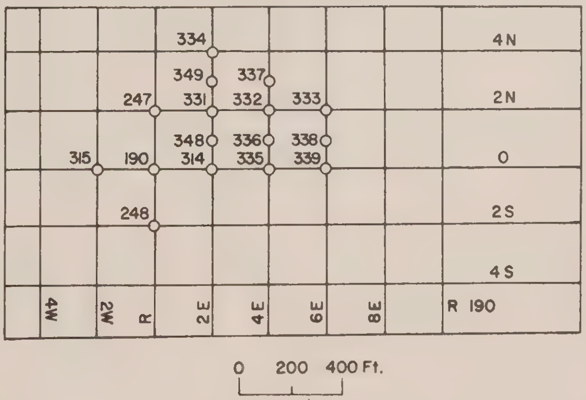


FIGURE V-5: Drill grid R-190 zone Western Mines Ltd.

AJME CLAIMS — Lead, Zinc
Pine Point Mines Ltd., — 85 B/16
Pine Point, N.W.T. — 60°58'N, 114°14'W

REFERENCES

Douglas and Norris (1974); Lajoie and Klein (1979); Patterson (1972); Skall (1975).

PROPERTY

AJME 1-433.

LOCATION

The claims are immediately south of Dawson Landing on the south shore of Great Slave Lake and 20 km northeast of the town of Pine Point (Figure V-6).

HISTORY

The claims were staked in April, 1976.

DESCRIPTION

The claims are at the east end of the Pine Point Lead Zinc District (Skall, 1975). The bedrock surface here includes the lower part of the Middle Devonian barrier reef complex or Pine Point Formation and the upper part of the Keg River Formation (Douglas and Norris, 1974). This corresponds with the stratigraphic level of the N 204 deposit shown in Figure 13 of Skall, 1975.

CURRENT WORK AND RESULTS

In the spring of 1978 Lloyd Geophysics Limited surveyed 140 km with time domain Induced Polarization (IP) which identified 5 anomalies. Diamond drilling was done on the AJME and adjacent claims between January, 1978 and February, 1979, but no significant mineralization was intersected in the anomalies tested.

TATHLINA 1	Lead, Zinc
Gulf Minerals Canada Ltd.,	85 C/15
Suite 1400, 110 Yonge St.,	60°49'N, 116°49'W
Toronto, Ontario., M5C	

REFERENCES

Belyea (1971); Douglas (1974); Maqueen and others (1975); Skall (1975); Williams (1977).

PROPERTY

Tathlina 1

LOCATION

The claim is about 7 km west of Heart Lake, which is about 30 km northwest of Enterprise along the Mackenzie Highway (Figures V-6 and V-7).

HISTORY

Previous metallic mineral exploration has not been reported, though sphalerite and galena occur in chip samples from oil well test holes drilled in the area.

DESCRIPTION

The area is underlain by the western extension of the Middle Devonian carbonate complex (Skall, 1975) which hosts the lead-zinc deposits of Western Mines Ltd. and Pine Point Mines Ltd. 90-120 km to the east (Fig. V-6). The claim is on the northeast side of the Tathlina Uplift (Belyea, 1971) and south of the southwesterly-trending Tathlina Fault (Douglas, 1974). This fault resembles the Pine Point 'hinge zones' (Skall, 1975) which are characterized by a distinct diagenetic dolomite facies, the Presqu'ile Formation (Williams, 1977).

Stratigraphic relationships are described in detail by Belyea (1971) and summarized in Table V-5 and Figure V-7. The entire Upper Pine Point Formation grades laterally into shales of the Horn River Formation along a carbonate front which extends through the claims. Macqueen and others (1975) found high values of lead, zinc and uranium in shale samples from the Bitumous Member of the Pine Point Formation and the Horn River Formation which they correlated with the amount of organic matter present.

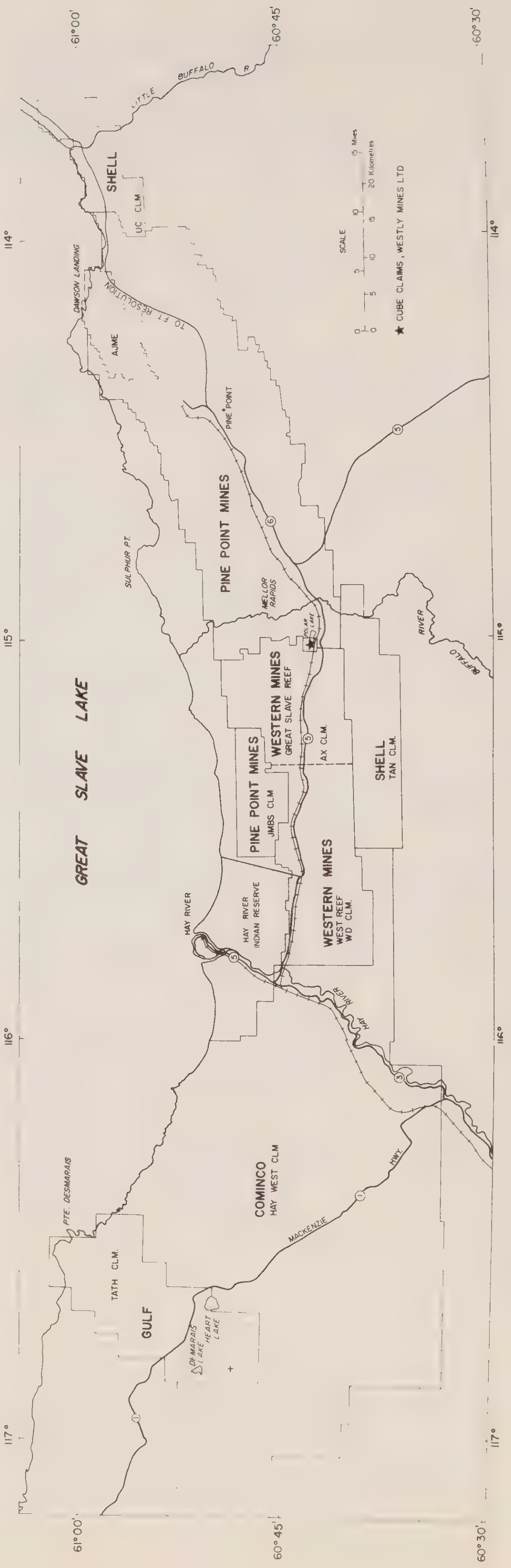


FIGURE V-6: Claim ownership south and west of Great Slave Lake

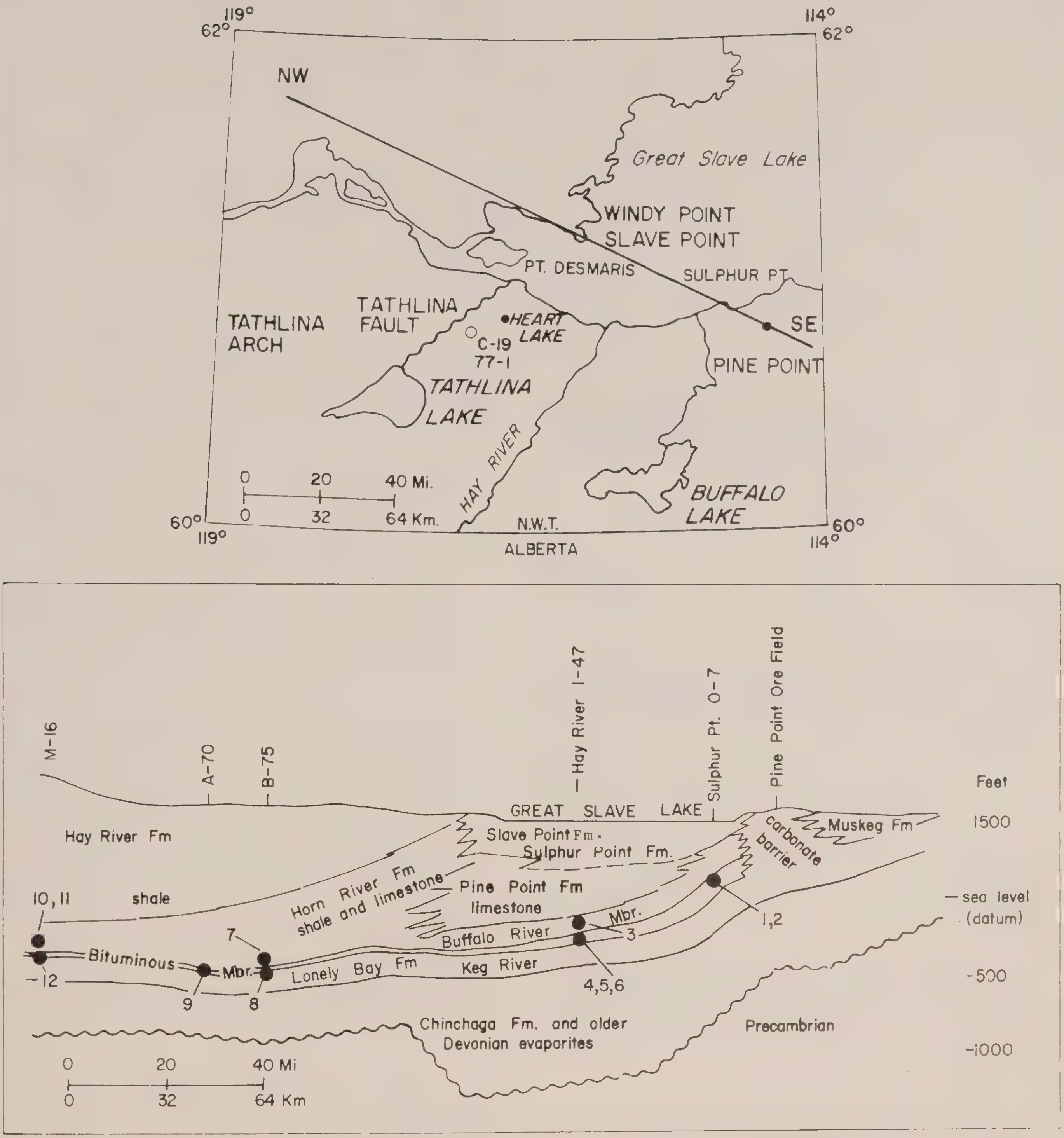


FIGURE V-7: *Geological cross section west end of Great Slave Lake. Modified from Macqueen and others, 1975.*

TABLE V-5 From Belyea 1971. Table of Formations, Tathlina Uplift

				NORTHERN ALBERTA		TATHLINA UPLIFT
DEVONIAN	UPPER			Fort Simpson Formation		Fort Simpson Formation
	MIDDLE			Slave Point Formation		Slave Point Formation
				Fort Vermilion Member		Fort Vermilion Member
		ELK POINT GROUP	Upper	Watt Mountain Formation		Watt Mountain Formation
				Sulphur Point Formation		Sulphur Point Formation
				Muskeg Formation	Upper Member	Muskeg Fm / Upper Pine Point Formation
					Black Creek Member / Rainbow (reef) Member	
				Keg River Formation	Upper Member	Horn River Formation
					Lower Member	Lower Keg River Member
				Chinchaga Fm Upper Member		Chinchaga Fm Upper Member
			Lower	Chinchaga Fm Lower Member		Basal beds
				Cold Lake Formation		
				Ernestina Lake Formation		
DEVONIAN OR OLDER				Basal beds		
				Precambrian		Precambrian

CURRENT WORK AND RESULTS

One hole (77-1) of 697.4 m depth was drilled within 200 m of an abandoned oil test NWT Desmarais Lake No. 1 C-19 in order to confirm and better define the extent of lead-zinc in the Lower Keg River Formation.

The presence of Presqu'ile dolomite and lead zinc mineralization was confirmed and additional claims were staked and further work was planned.

MARY and HA CLAIMS
Cominco Ltd.,
200 Granville Square,
Vancouver, B.C. V6C 2R2

85 F/1,8
61°15'N, 116°8'W

REFERENCES

Cameron (1918); Douglas (1974); Douglas and Norris (1974); Gibbins (1978b); McGlynn (1971); Norris (1965); Skall (1975); Thorpe (1966); Williams (1977).

PROPERTY

231 HA and 13 MARY claims.

LOCATION

The claims are between Slave Point and Windy Point on the northwest shore of Great Slave Lake, 88 km east of Fort Providence and 96 km northwest of the town of Pine Point (Figure V-8).

Access is by air, boat and winter road.

HISTORY

In 1955 over 2,000 claims were staked near the west shore of Great Slave Lake west of Caribou Point, Sulphur Bay and Windy Bay and around Falaise and Prairie Lakes and east of Boulogne Lake. Most of these were staked by the Windy Point Mining Company (McGlynn, 1971). In 1956, the claims were geochemically prospected, mapped at a half mile to the inch and 20,000 feet were drilled in about 120 holes (Fig. 8, 1965). Most of the holes were short and only penetrated to the base of the Presqu'ile dolomite. Lead-zinc mineralization encountered in a number of holes, was not economic and closely spaced drilling failed to outline zones of significant size.

In 1965, Elgin Petroleum Corp., a subsidiary of Rayrock Mines Ltd., did an IP survey and 4,995 feet of drilling in 24 holes on the LIP and LOT groups on the south shore of Windy Bay (Thorpe, 1966, p. 30). At that time Consolidated Mining & Smelting Co. did IP and 3,941 feet of drilling in 20 holes on 350 PIP claims, east of Prarie Lake and west of Windy Point.

DESCRIPTION

A major northeast-trending graben that underlies the west end of Great Slave Lake separates the Slave Point-Windy Point area from Pine Point (Douglas, 1974 and Douglas and Norris, 1974). The geology of the two areas is similar in most respects and has been summarized as follows by Williams (1977, p. 7):

> Slave Point is a prominent geographic feature on the north shore of Great Slave Lake, after which the Slave Point Formation was named. A few kilometers to the north is Windy Point ... where there is an extensive exposure of a reef-like mass of carbonate, in part altered to coarsely crystalline dolomite (The Presqu'ile Formation.) The reef-complex is identical, lithologically, with the ore-bearing reef-complex at Pine Point, with which it has always been correlated (Cameron, 1918; Norris, 1965).
>
> In the past the Presqu'ile Formation has been considered to be time-rock unit - a facies of the Sulphur Point Formation - lying between the Slave Point carbonate above and the Pine Point carbonate below (see Norris, 1965, Figs. 3,6). It is now becoming increasingly evident that the Presqu'ile-type dolomite (i.e. very coarse dolomite) is a diagnetic facies not limited to any definite horizon or any one original type of carbonate (Skall, 1975). In the Slave River map-area, the Presqu'ile facies is found at any horizon from the Keg River platform to high in the Slave Point Formation. Furthermore, the Presqu'ile facies tends to migrate up-section from south to north. Along the carbonate front in the Slave River map-area, there are several wells where the Slave Point is, in part (in one case entirely) altered to a Presqu'ile facies, some 60 m (200 ft.) stratigraphically higher than the position of the Presqu'ile facies at Pine Point.

There is no evidence of major faulting but a number of minor faults cut the Paleozoic rocks. These faults strike west-northwest and west and have small displacements.

Most of the sulphide mineralization is in the coarse replacement dolomites in the reef structure. Galena and sphalerite are found as isolated crystals, in seams, as disseminated grains or irregular patches in the coarse dolomite, or as veinlets in brecciated fine-grained dolomite. Pyrrhotite and chalcopyrite are sometimes associated with the other sulphides. In all the formations pyrite, galena and sphalerite are

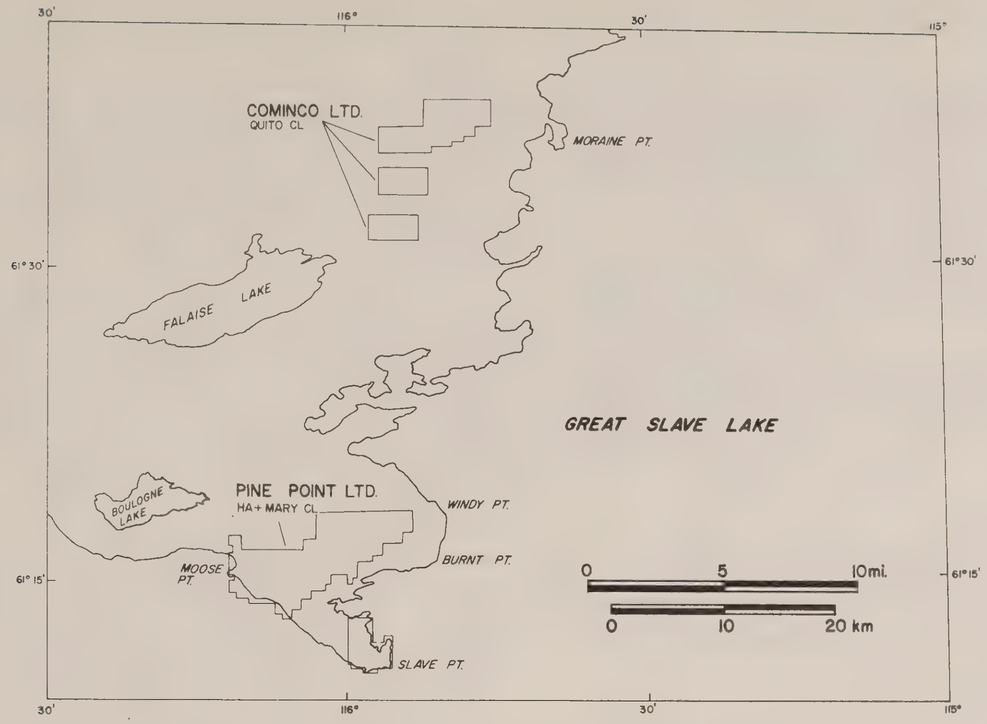


FIGURE V-8: Claim locations Slave Point-Moraine Point.

sometimes found disseminated through the coarse portions of the Presqu-ile Formation but no concentrations of economic interest were outlined by the drilling (McGlynn 1971, p. 162).

CURRENT WORK AND RESULTS

In August and September, 1978, nine people from Kenting Exploration Services Ltd. did an IP survey of the claims. The geometry for the survey was a pole-dipole arrangement with an electrode spacing of 75 m. Readings were taken at four separations (N-1,2,3,4) for each current position.

A few anomalies were identified. They tend to be small in magnitude but fairly large in areal extent. Further work, gravity or drilling, was recommended.

QUITO CLAIMS	Zinc, Lead
Cominco Limited,	85 G/12
200, Granville Square,	61°36'N, 115°50'W
Vancouver, B.C., V6C 2R2	

REFERENCES

Douglas (1958); Douglas and Norris (1974).

PROPERTY

QUITO 1-77

LOCATION

The property is located 5-15 km west of Moraine Point, on the west shore of Great Slave Lake, approximately 96 km east of Fort Providence, 120 km southwest of Yellowknife and 80 km due north of Hay River.

HISTORY

The area was identified by a zinc lake sediment anomaly found during a reconnaissance survey.

The QITO 1-66 claims were staked in July and August, 1976; QITO 67-77 were added in 1978. In August, 1976, 397 soil samples were collected from the B horizon at 100 m intervals along lines spaced 100 to 200 m apart. Zn and Pb soil anomalies were obtained, mainly on the central and western parts of the claim group. The highest values were 3,000 ppm Zn and 500 ppm Pb.

DESCRIPTION

The area is underlain by limestone and dolomite of the Middle Devonian Pine Point Formation (Douglas, 1958 and Douglas and Norris, 1974); however, topographic relief in the area is low and outcrop is scarce.

CURRENT WORK AND RESULTS

Kenting Exploration Service Ltd. completed an IP survey which was begun in 1977 but was halted by a forest fire. Anomalous chargeability values are attributed to noise, pyritic shale and possibly sulphide mineralization.

EAST ARM OF GREAT SLAVE LAKE

The first systematic mapping of the East Arm was accomplished by Stockwell (1932) between 1928 and 1930. His table of formations (1936) has been the basis for subsequent geological work in the area. He divided the Precambrian rocks into three major groups, named in ascending order the Wilson Island, Great Slave and Et-then Groups, each separated by angular unconformities. A fourth relatively minor division, the Union Island Group, was deposited during the same interval as the Great Slave Group, but

its stratigraphic relations to the Great Slave were unknown.

Detailed mapping, stratigraphic, sedimentologic and tectonic studies by P.F. Hoffman and assistants since 1966 have improved our understanding of the East Arm. Hoffman's 1977 table of formations summarized present knowledge of the stratigraphy of the area.

EVE 1-101	
SERU Nucleaire (Can.) Limitee,	Uranium, Vanadium
#610, 1130 Sherbrooke St. W.,	85 H/9,10
Montreal, Quebec, H3A 2M8	61°36'N, 112°30'W

REFERENCES

Hoffman (1968, 1969, 1973); Hoffman and others (1977); Padgham and others (1975); Stockwell (1932, 1936); Stanworth (1975); Walker (1978).

PROPERTY

EVE 1-101

LOCATION

The claims are located in the south half of the west end of Preble Island, bordering the northwestern margin of Hornby Channel (Fig. V-9). Preble Island is 140 km southeast of Yellowknife, at the southwestern part of the East Arm of Great Slave Lake.

HISTORY

Uranium was discovered on the northern part of Simpson Island in 1969 by Edward Jones and considerable uranium exploration followed in the Simpson-Preble Island and other areas in the East Arm in the early 1970s. Vestor Explorations Ltd. was the most active company and exploration was concentrated on the Sosan Group (Padgham and others, 1975; Stanworth, 1976; and Walker, 1978).

Prospecting in 1977 by SERU Nucleaire personnel located several radioactive localities on the south shore of Preble Island. These are caused by pitchblende in rocks of the Paleohelikian Et-Then Group. The EVE claims were staked in October 1977.

The stratigraphy and lithology of Preble Island is summarized in Table V-6. A major unconformity separates members of the Helikian Et-Then Group from the underlying Aphebian Sosan Group and Seaton Volcanics.

DESCRIPTION

The claims are mainly underlain by Murky Formation, a thick series of intercalated polymictic conglomerates and basalt. The overlying Preble Formation sandstone lies to the west and north of the claim group. A fault bounded block of Aphebian units, mainly sandstone of the Sosan Group, outcrop in the vicinity of (two) small bays on the south shore of Preble Island, just west of the eastern limit of the claim block.

CURRENT WORK AND RESULTS

Most of the 1978 work consists of mapping and prospecting the claims. The first phase involved traversing 112 km of cut lines with a 244 m grid spacing. Three geology-prospecting teams flagged and sampled all radiometric anomalies over 1,000 cps (SPP 2). In areas where numerous anomalies were discovered, there was a second phase of detailed prospecting. During this survey, radioactive debris attributed to the Cosmos 954 satellite was frequently detected.

A total of 243 anomalies, exceeding 1,000 cps SPP 2, were discovered, mostly in the Murky basalt, particularly within 60 m of basalt-conglomerate contacts. All of the anomalies are caused by pitchblende in discontinuous fractures, that are generally less than 1 m long. Most fractures are hematized and commonly filled by calcite veins related to the uranium mineralization. Yellow secondary oxidation products of uranium are present wherever radioactivity exceeds 5000 cps. Copper sulphides and malachite are associated with larger anomalies in amygdaloidal basalts of the Murky Formation. Vanadium is also present.

Several anomalies over 15,000 cps coincide with prominant structures and demonstrate the importance of regional tectonics to mineralization. All but one of these anomalies is in the Murky Formation, the exception is one in the Kluziai Formation of the Aphebian Sosan Group. Better assays range from 0.1% to 1.0% uranium and 400 to 1,500 ppm vanadium, with selected material as high as 6.6% uranium and 2,800 ppm vanadium.

Two holes were drilled on the claims in 1978, the first to test the Helikian stratigraphy and possibly intersect a thick sequence of alternating conglomerates and basalts. It was suspended at a total depth of 764.4 m with no indications of nearing the Aphebian basement. The lower conglomerate-basalt contacts may be faulted. Anomalous radioactivity was not detected in the core or in the hole. A second drill hole of 295.3 m was drilled to test the Aphebian. It intersected Sosan Group sediments before bottoming in basement volcanics. Again anomalous radioactivity was not detected. However, the extensive occurrence of quartz stockwork, brecciation, chloritization and sericitization indicate the presence of a large shear zone extending under the Hornby Channel in the vicinity of the drill site.

Although numerous uranium showings were found, large open structures thought necessary for economic concentrations of uranium were not found suggesting that the claims have limited potential.

MP CLAIMS	Copper
Giant Yellowknife Mines Ltd.,	75 K/11
Yellowknife, N.W.T.	62°42'N, 109°17'W

REFERENCES

Hoffman (1968, 1977); Hoffman and others (1977); James (1972); McGlynn (1971); Padgham and others (1975); Stockwell (1968); Thorpe (1966, 1972).

PROPERTY

MP 1-7

LOCATION

The claims cover Maufelly Point near the east end of the East Arm of Great Slave Lake about 285 km east of Yellowknife. The northeast end of Maufelly Point is about 1 1/2 km west of Reliance.

HISTORY

The southwestern half of Maufelly Point was formerly covered by the 28 GEM claims. In 1965, Nahanni Mines Ltd. mapped the property and trenched several showings. In 1967 the Mark Joint Venture drilled 4 holes totalling 431 m on the Shore Showing (Thorpe, 1972, p. 29); assays gave grades between 0.2-0.5% Cu over 6-15 m. These values were too low to be of economic interest.

The northeastern part of Maufelly Point was

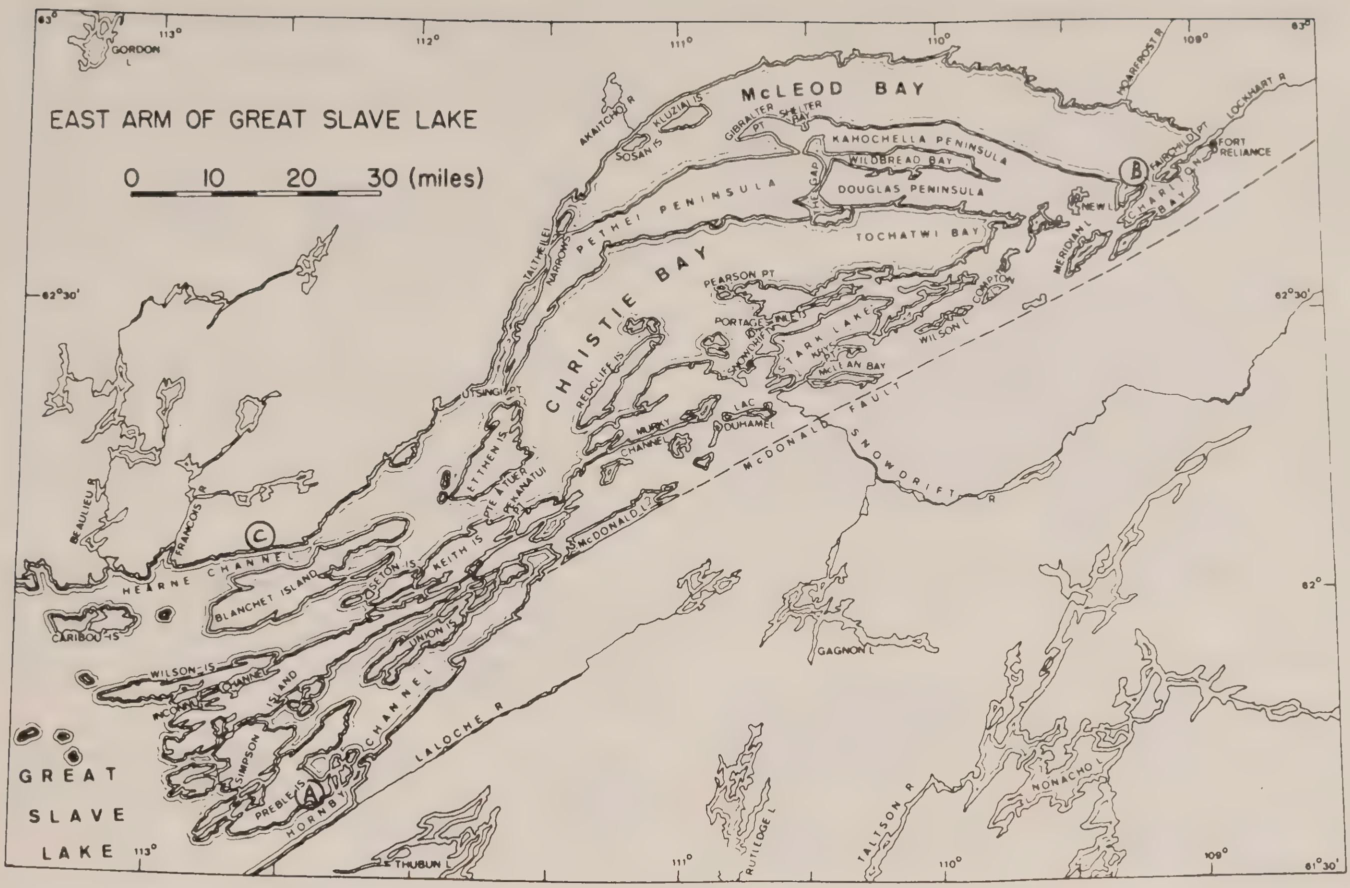


FIGURE V-9: East Arm of Great Slave Lake showing geographic names and EVE claims = A, MP claims = B and Thor Lake = C.

TABLE V-6: Table of Formations - Preble Island, Great Slave Lake

PALEOHELIKIAN	ET-THEN GROUP	Preble Formation - fine grained, buff to red colored isogranular sandstones, feldspathic quartzites and quartzites; locally with pebbly bands
		Murky Formation - mostly buff colored polymictic cobble, pebble and minor boulder conglomerate in a predominantly quartzitic matrix; thick bedded; feldspathic sandstone bands common
		Dark green to reddish brown colored basalt flow; commonly massive, amygdaloidal, hematitic porphyritic and/or vesicular; local oxidation bands. Intercalated with conglomerate.
		Red to buff colored polymictic boulder, cobble and pebble conglomerate in a predominantly arkosic matrix; mostly granite clasts; very thick bedding; little sedimentary features; pebbly and feldspathic sandstone bands
		UNCONFORMITY
APHEBIAN	SOSAN GROUP	Seton volcanics - green to dark green intermediate volcanics; mostly foliated
		Akaitcho Formation - very fine grained, reddish micaceous ferruginous sandstones; gradational with Kluziai Formation
		Kluziai Formation - pale white to pink colored, fine grained isogranular quartzite; quartz veining common; locally intertongues with Hornby Channel Formation
		Hornby Channel Formation - buff and grey with purplish mottling; coarse grained feldspathic sandstone, microconglomerate and minor conglomerate, predominantly quartz granules and pebbles

formerly staked as the AZA claims. In 1954, Chesterfield Mines Ltd. drilled 916 m in 10 holes.

The 16 ANN claims which adjoin the MP claims to the southwest were staked in 1955. Considerable exploration has been done on these claims (Thorpe, 1972; McGlynn, 1971; James, 1972). Geophysical surveys by Hudson Bay Oil and Gas Co. in 1971 is the last recorded work (Padgham and others, 1975, pp. 26-27).

DESCRIPTION

There are numerous structurally controlled low grade copper showings on the MP and adjacent ANN claims. Chalcopyrite occurs disseminated throughout the rocks and filling fractures, quartz-carbonate veins and stockworks. The mineralization is in silicified dolomite, siltstone and red and black shales of the Great Slave Supergroup (Table V-7 and Hoffman, 1968, 1977). The most impressive of these showings are clustered near the Murky Fault and the Meridian Fault, structures which define a small graben underlying Maufelly Point.

In addition to low copper values, minor gold and silver values have been recorded for a number of the showings.

CURRENT WORK AND RESULTS

In 1976, Maufelly Point was mapped and sampled in detail to determine if the area had any potential for sedimentary copper similar to the Zambian Copper belt or Mt. Isa, Australia. Favourable silica-dolomite ratios, believed to be in the 0.42-0.48 range, were not identified. However, samples from the Douglas and Stark Formations are dolomitic and suggest an irregular increase in copper as they approach the favourable ratio.

The MP claims were recorded in September, 1978.

Table V-7 GREAT SLAVE SUPERGROUP AT MAUFELLY POINT after Hoffman, 1977

	Diabase dyke
qc	Quartz-carbonate stockwork
Christie Bay Group	
Csm	Stark Formation, mudstones
Csc	Stark Formation, carbonates
Pethei Group	
Pp	Pekanatui Formation, limestone and argillite
Pm	McLean Formation, argillite
Pu	Utsingi Formation, limestone
Pd	Douglas Formation, marlstone, argillite and carbonates
Kahochella Group	
Kc	Charleston Formation, argillite
Km	McLeod Formation, shale
Kg	Gibralter Formation, shale
Sosan Group	
Sa	Akaitcho Formation, siltstone

BLACHFORD LAKE PLUTONIC COMPLEX

THOR PROJECT — U, Th, Nb, Ta, REE
Highwood Resources Ltd., — 85 I/1,2
400, 805 8th Ave. S.W., — 62°07'N, 112°35'W
Calgary, Alberta, T2P 1H7

REFERENCES
Davisdon (1972, 1978); Gibbins (1982); Grasty and Richardson (1972).

PROPERTY
THOR 1-45, NB 1-172 and DISA 1-5

LOCATION
The claims are centered on a small lake 105 km southeast of Yellowknife that is informally called Thor Lake. It is halfway between Blachford Lake 5 km to the north, and Hearne Channel of Great Slave Lake, 5 km to the south (C in Figure V-9).

HISTORY
The area was staked as ODIN 1-4 in 1970 and minerals containing uranium, thorium and rare earth elements were noted, but very little work was done and the claims lapsed.

A government radiometric survey flown in 1971 outlined a significant uranium and thorium anomaly (Grasty and Richardson, 1972).

During the fall of 1976, geologists of Highwood Resoources Ltd. discovered a number of previously unknown mineral showings north of the original discovery and staked the THOR 1-4 claims. Additional claims were added later when spectrographic analyses indicated quantities of niobium, yttrium and rare earths.

In 1977, Highwood did extensive prospecting, mapping, sampling, radiometric surveys, trenching in the T zone and 335 m of diamond drilling in the S zone (Table V-1 in Gibbins, 1982).

DESCRIPTION

The claims cover the central core of the Blachford Lake Plutonic complex known as the Thor Lake Syenite. Davidson (1978) mapped 5 distinct syenite units of Thor Lake Syenite. A sixth unit of altered and poorly exposed syenite occurs around and south of Thor Lake (the Lake Zone).

Hornblende is replaced by fine aggregates of hematite, albite, flourite and pale biotite. Davidson (1978) interprets this as intense alteration of pre-existing syenites, possibly developed under the influence of a late-stage magmatic vapour phase related to, though probably slightly later than, the emplacement of pegmatites and acmite-albite veins to the east.

The T zone is a zone of black rocks containing veins and irregular masses of pink to buff coloured flourite-albite, which extends for at least 1250 m north-northwest of Thor Lake (Fig. V-10). This zone cuts through the outer syenite contact into the Grace Lake granite. The F or Flourite zone may be a south-easterly extension of the T zone. The R and S zones, extend east-northeast from the southern exposed part of the T zone and contain similar rocks, which are associated with narrow systems of syenite pegmatite and acmite-albite veins. All of these zones are anomalously radioactive and contain uranium, thorium and rare earth elements in varying proportions and abundances.

CURRENT WORK AND RESULTS

Highwood Resources Ltd. continued to map, prospect, trench and sample the claim area. In October and November 1, 1,091 m were drilled in 12 holes, 10 on the T zone and 2 on the Lake zone. All but two holes

intersected mineralization.

At the end of 1978, company engineers inferred a reserve in the T zone of 1.5 million tons grading 12 lbs. Cb_2O_5/ton and 0.3 lbs. U_3O_8/ton. A tonnage of 75,000 tons of 30 lbs Cb_3O_5/ton and 1 lb. U_3O_8/ton was inferred in the S zone.

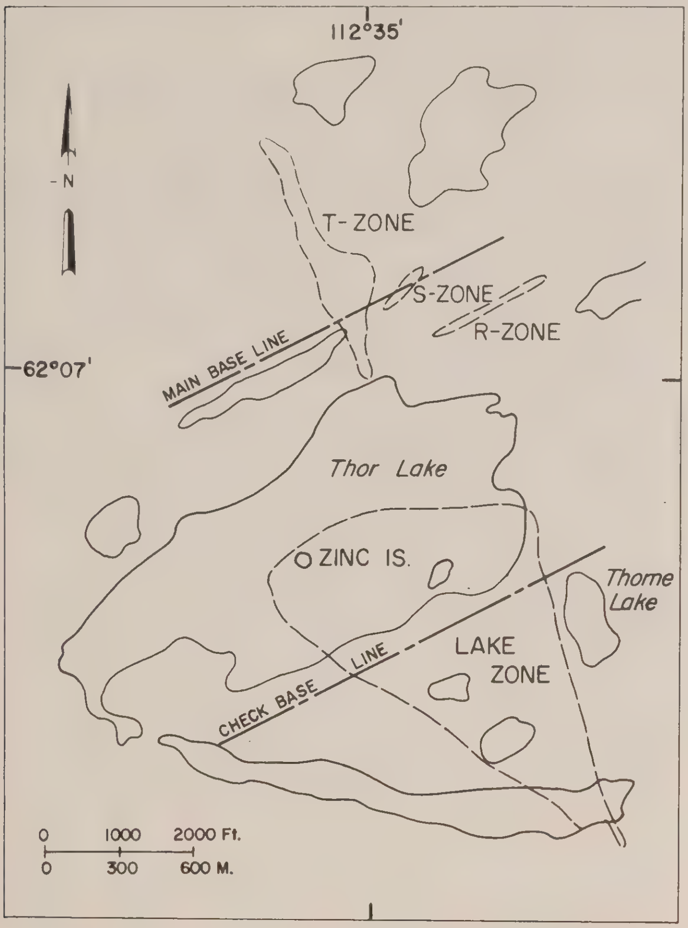


FIGURE V-10: Principal mineralized zones-Thor Lake.

CHAPTER VI

BEAR STRUCTURAL PROVINCE

J.B. Seaton, Mackenzie District Geologist
D.I.A.N.D. Geology Office, Yellowknife

The geology of the Bear Structural Province has been summarized in several previous Mineral Industry Reports (Seaton 1978, 1982; Seaton and Hurdle, 1978). In this report the general reference list for the Bear Province is up dated, but no attempt is made to summarize the geology, beyond a statement of the geological subdivisions under which the properties have been grouped. Many Geological Survey of Canada and University thesis projects are in progress covering parts of the Bear Province and it is anticipated that within the next two years a drastically revised geological summary may be required.

Subdivisions of Bear Province (Fig. VI-1) under which properties are grouped and discussed:

Bathurst Plate
- Kilohigok Basin (Aphebian); Campbell and Cecile, 1975; 1976a, b).
- Hiukitak Platform and Elu Basin (Helikian) and the area underlain by: Helikian sediments and basalts at the mouth of Bathurst Inlet and on the Kent Peninsula, and by the possibly Hadrynian sediments of Jameson Island (Campbell, 1978, 1979). Northwesterly striking grabens influence the distribution of Aphebian and Helikian rocks in the Bathurst Inlet area.

Wopmay Orogen (Aphebian)
- Epworth Group; autochthonous zone.
- Epworth Group; Asiak fold and thrust belt.
- Hepburn metamorphic-plutonic belt.
- Great Bear volcano-plutonic complex.
- Pre-Great Bear volcano-plutonic complex basement (metasediments and granitoids).

Amundsen Basin (Helikian-Hadrynian)
- Area underlain by sediments of the Hornby Bay Group (units 8-10, Baragar and Donaldson, 1973).
- Area underlain by sediments of the Dismal Lakes Group (units 11-16, Baragar and Donaldson, 1973).
- Volcanics (mainly subaerial basalt flows) and sediments of the Coppermine River Group (Helikian).
- Sediments of the Hadrynian Rae group with numerous gabbro sills (Coronation Sills).

Most of the last three subheadings form the Coppermine Homocline. The Hornby Bay Group rocks generally dip gently and strike somewhat variably and so cannot be included in the homocline.

The Aphebian rocks of the Epworth Group, the Goulburn Group in the Kilohigok Basin, and the Great Slave Supergroup can be crudely correlated (Campbell and Cecile, 1976c), as can the Helikian formations of the Amundsen Basin, Bathurst Inlet area and the East Arm subprovince. Moreover, the geology of all three areas appears to have more in common with the Bear than with the Slave and Churchill structural provinces. For this reason the Proterozoic rocks of the Bathurst Inlet area are included here in the Bear Structural Province and not as a Slave subprovince as outlined by C.H. Stockwell in Geological Survey of Canada, Economic Geology Report Number 1 (fifth edition, 1968).

Primary grouping of properties is under the headings:

Bathurst Plate
Wopmay Orogen
Wopmay Orogen - Amundsen Basin (where properties or projects span or lie close to the Aphebian-Helikian unconformity).

Within this framework a secondary arrangement of properties in alphabetical and numerical sequence of NTS references is used. The subdivisions to which the rocks underlying the properties and project areas belong are mentioned in the individual reports.

The East Arm Subprovince, though geologically included with the Bear Province, is covered on Chapter 4 of this Mineral Industry Report.

References relating to individual property descriptions are listed separately in the appropriate sections. General information on the Bear Structural Province and detailed reports on mapping of specific areas of the Bear Province include those by:

Allan and Cameron (1973); Badham (1972, 1978); Baragar and Donaldson, (1973); Campbell (1978, 1979); Campbell and Cecile (1975, 1976a, b, c); Cecile and Campbell (1977); Easton (1980); Fraser (1964, 1974); Fraser and others (1972); Gibb (1978); Grasty and Richardson (1972); Henderson, J.F. (1949); Hoffman (1973, 1978, 1980a, b); Hoffman and Bell (1975); Hoffman and Cecile (1974); Hoffman and Henderson (1972); Hoffman and McGlynn (1977) Hoffman and others (1970, 1977a, b, 1978, 1980); Kerans and others (1981); Hornbrook and others (1976b); Kidd (1936); Kindle (1972); Lord (1941, 1942, 1951); Lord and Parsons (1952); McGlynn (1957, 1974, 1975, 1976, 1977, 1980); McGlynn and Ross (1963); Murphy and Shegalski (1972); Mursky (1963, 1973); Padgham and others (1974); Shegalski and Thorpe (1972); Smith (1962, 1967); St.-Onge and Hoffman (1980); Thorpe (1970); Tremblay (1974); Wilson and Lord (1942).

BATHURST PLATE

Kilohigok Basin

ANN, LOU and PAT CLAIMS	Uranium
Prospecting Permit 523,	76 H/5
Giant Yellowknife Mines Ltd.,	$65^{o}20' - 65^{o}30'$N
Exploration Department,	$105^{o}00' - 105^{o}40'$W
Precambrian Building,	
Yellowknife, N.W.T.,	
XOE 1HO.	

REFERENCES

Campbell (1978, 1979); Campbell and Cecile (1975, 1976); Cecile and Campbell (1977); Craig (1964); Fraser (1964); Henderson, (1979) ; Tremblay (1974); Wright (1967).

PROPERTY

ANN claim: LOU claim; PAT claim Prospecting Permit 523.

LOCATION

The properties form a single block roughly 530 km northeasterly of Yellowknife (Fig. VI-1). This block covers a 12 km length of the Ellice River extending downstream from its source. In this area the Ellice River flows northwesterly along the Bathurst Trough through a string of lakes. From southeast to northwest the property comprises: the ANN, LOU, and PAT claims, and Prospecting Permit 523 which covers 76 H/5NW.

HISTORY

The ANN, LOU and PAT claims were recorded in January, 1978.

Prospecting Permit 523 was granted to Taiga Consultants Limited on January 1st and later optioned to Giant Yellowknife Mines Limited.

DESCRIPTION

Sandstone of the Helikian Ellice River Formation fills the Bathurst Trough on parts of the LOU and PAT claims and on Prospecting Permit 523. Archean granitoid gneiss, metamorphosed supracrustal rocks and minor granitoid plutons form the basement to the 3 km wide belt of Helikian sediments. The basement rocks belong to the Churchill or Slave structural province, but the boundary between these provinces may require revision (Henderson 1979, 1980) as a result of recent and current work by the Geological Survey of Canada.

The largest scale published geological map of the area is at 1:125,000 (Tremblay, 1971). The adjoining area to the north has been the subject of more recent studies of the Aphebian and Helikian stratigraphy (Campbell 1978; Campbell and Cecile 1975, 1976; Cecile and Campbell 1977).

A northwesterly direction of ice movement is indicated by drumlinoid features and deposits of braided glacial outwash have accumulated in the southeast corner of Prospecting Permit 523 (Craig, 1964).

CURRENT WORK AND RESULTS

An eight-man crew prospected the ANN, LOU, and PAT claims.

A grid covering roughly 2.25 sq. km was constructed over the southern tip of the belt of Ellice River Formation sandstone. This grid is on the western part of the LOU claims.

Magnetometer, VLF-EM and radiometric surveys explored the grid. The VLF-EM survey outlined several conductive zones along and near the surface trace of the sub-Helikian unconformity. The magnetometer and radiometric surveys were reported to be rather featureless.

A north-northwesterly trending 500 x 1,000 m zone of anomalously radioactive glacial erratics and radioactive outcrops crosses the central parts of the ANN, LOU and PAT claims. It is underlain by gneisses with a foliation generally parallel to the radioactive zone and its associated trains of erratics. The greatest concentration of radioactive boulders was found on the PAT claims.

WOPMAY OROGEN

BW, C and LOO CLAIMS	Uranium
Eldorado Nuclear Limited,	85 N/10
Suite 400, 255 Albert Street,	63°34'N, 116°46'W
Ottawa, Ont., K1P 6A9	

REFERENCES

Douglas and others (1974); Hoffman and McGlynn (1977); Lord (1942); McGlynn (1968); Seaton (1982).

PROPERTY

BW 1-4; C 1-6; LOO 1-36.

LOCATION

The LOO and C claims are at Lou Lake 175 km northwest of Yellowknife. The BW claims are a separate block about 1.5 km south of the LOO and C claims (Fig. VI-2).

HISTORY

The claims were recorded in 1977 and lake sediments and water were sampled from a 35 square km area which included the claims. The same area was explored by an airborne radiometric survey (Seaton, 1982).

DESCRIPTION

Aphebian metasediments and volcanics, intruded by quartz porphyry, quartz-feldspar porphyry and porphyritic granite, underlie the claims.

CURRENT WORK AND RESULTS

Geological mapping, lake sediment sampling and prospecting explored the claims.

Mapping revealed the volcanic sequence includes ignimbrite, crystal tuff, lapilli tuff, breccia, agglomerate and waterlain pyroclastics. A major fault strikes northeasterly through Lou Lake.

MAZ CLAIMS	Uranium
Eldorado Nuclear Limited,	85 N/11
Suite 400, 255, Albert Street,	63°38'N, 117°06'W
Ottawa, Ont., K1P 6A9	

REFERENCES

Douglas and others (1974); Seaton (1982).

PROPERTY

MAZ 1-40.

LOCATION

The property is near Mazenod Lake, 190 km northwesterly of Yellowknife (Fig. VI-2).

HISTORY

The MAZ claims were recorded in 1977, following lake sediment and lake water sampling.

In 1977 a radiometric survey was flown and lake sediment, lake water surveys and prospecting continued.

DESCRIPTION

The property is underlain by an inlier of Aphebian granitoid rock and Ordovician dolomite of the Mazenod member of the La Matre Falls Formation.

CURRENT WORK AND RESULTS

Geochemical mapping revealed scattered small areas of frost heaved boulders of Cambrian Old Fort Island Formation, suggestive of a subcropping unit of this rock.

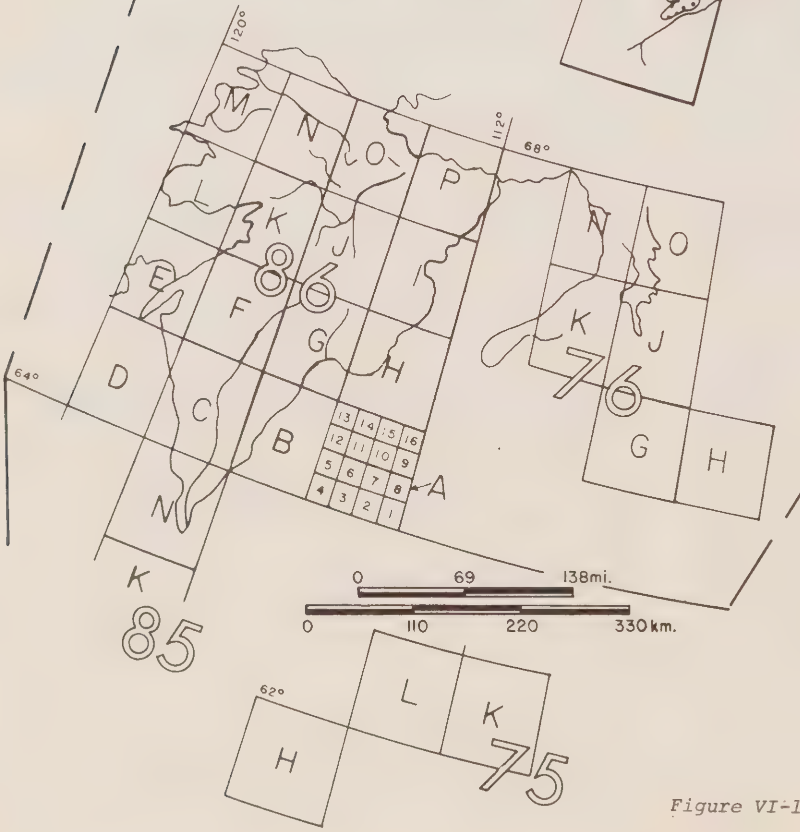
Geochemical surveys in 1978 included lake sediment and water sampling and stream and bog water sampling. Soil samples were collected during prospecting. The geochemical samples were analyzed for uranium.

(Pal) Paleozoic cover
BEAR STRUCTURAL PROVINCE
PROTEROZOIC
HADRYNIAN
R RAY GROUP and Coronation Sills

NEOHELIKIAN
Nv COPPERMINE RIVER GROUP; basalt, sandstone, siltstone

PALEOHELIKIAN
Ho Di DISMAL LAKES GROUP; dolomite overlying red mudstone, sandstone and black shale.

HORNBY BAY GROUP; sandstone, siltstone, shale, dolomite, conglomerate.



BEAR STRUCTURAL PROVINCE
PROTEROZOIC
APHEBIAN

GBB Great Bear volcano-plutonic complex: Includes the McTavish Volcanics Supergroup (Hoffman, 1978) and plutons of the Great Bear Batholith

H Hepburn metamorphic-plutonic belt: Includes the Akaitcho Group and some metamorphosed rocks of the Epworth and Snare Groups.

EA, G, E, Sna East Arm subprovince, Goulburn Group, Epworth Group, Snare Group. The East Arm subprovince is not reported in Chap. VI.

(C) CHURCHILL STRUCTURAL PROVINCE
PROTEROZOIC AND ARCHEAN

(S) SLAVE STRUCTURAL PROVINCE, ARCHEAN

Figure VI-1: Bear Structural Province. Key map.

A photogeological study of the Quaternary geology was made.

PA CLAIMS
Rayrock Resources Limited,
1011-2200, Yonge Street,
Toronto, Ont., M4S 2C6

Uranium
85 N/11
$63^{\circ}35'$N, $117^{\circ}16'$W

REFERENCES

Douglas and others (1974).

PROPERTY

PA 1-28.

LOCATION

The claims are roughly 200 km northwesterly of Yellowknife and 10 km south of Sarah Lake (Fig. VI-2).

HISTORY

The PA claims cover ground previously staked as the HUMP claims in 1955. After seven trenches had been excavated on a quartz stockwork the HUMP claims were allowed to lapse. PA 1-28 were staked and optioned by the Ryowa-Rayrock joint venture.

During 1977 geological mapping, radiometric prospecting, radon gas sampling and soil sampling explored part of the claims where an inlier of Aphebian rocks is cut by an east-northeasterly trending quartz stockwork.

DESCRIPTION

Largely dolomitic rocks of the Paleozoic La Matre Falls Formation surround an inlier of Precambrian granitoid rock and metasediments which include conglomerate, arkose and argillite. Sparse uranium and copper mineralization is found in fractures and veinlets in a quartz stockwork cutting the inlier.

Paleozoic conglomerate is reported to contain minor chalcopyrite. The clasts in the conglomerate are mostly quartz and probably derived from the stockwork.

CURRENT WORK AND RESULTS

Geological mapping, soil sampling, a VLF-EM survey and bedrock sampling using a Winkie drill was concentrated in an area of geochemical and geophysical anomalies south of the area where Precambrian rocks and Paleozoic conglomerate outcrop. Sixty-two metres were drilled in five holes. Significant uranium or copper mineralization was not intersected.

MAR CLAIMS
Noranda Exploration Co. Ltd.,
Box 1619,
Yellowknife, N.W.T., XOE 1HO

Copper
85 N/15
$63^{\circ}47'$N, $116^{\circ}54'$W

REFERENCES

McGlynn (1979); Seaton (1978, 1982); Seaton and Hurdle (1978).

PROPERTY

MAR 1-12.

LOCATION

The claims are 190 km northwesterly of Yellowknife (Fig. VI-2).

HISTORY

Following acquisition of the adjoining DIANNE and SUE claims in 1974, the surrounding area was explored by an airborne radiometric survey and in 1975 by an airborne magnetometer survey (Seaton, 1978).

MAR 1-8 were staked in 1976 and MAR 9-12 in 1977.

CURRENT WORK AND RESULTS

A 137 m diamond drill hole intersected low grade copper mineralization over its entire length. The best assay was 0.086% Cu over 1.5 m.

Most of the hole was drilled through brecciated feldspar-quartz porphyry. The matrix of the breccia was reported to consist of "rock flour" with variable amounts of magnetite and specular hematite.

LEVI, WOP CLAIMS
Chevron Standard Ltd.,
400, Fifth Avenue, S.W.,
Calgary, Alberta.

Uranium
86 B/13, 86 C/16
$64^{\circ}50'$N, $116^{\circ}00'$W

REFERENCES

Frith (1973, 1978); Lord (1942); Seaton (1981).

PROPERTY

LEVI 1-6; WOP 1-608.

LOCATION

The property (Fig. VI-2) is roughly 280 km northwesterly of Yellowknife and 10 km east of Little Crapeau Lake. The LEVI group is enclosed within the large WOP claim block at $64^{\circ}50'$N, $116^{\circ}04'$W.

HISTORY

In 1976 Chevron sampled lake sediments over a 6,144 square km area. The LEVI claims were staked by D. Taylor in 1976 and the surrounding WOP claims by Hosford, Impey and Welter Limited in early 1977. Chevron Standard explored the LEVI and WOP claims in 1977 (Seaton, 1982).

DESCRIPTION

The LEVI and WOP claims lie 20 to 30 km west of the boundary between the Bear and Slave structural provinces. The geology has been mapped and metamorphic studies of the surrounding area made (Lord, 1942; Frith 1973, 1978). The local geology is briefly reviewed in the 1977 Mineral Industry Report (Seaton, 1982).

CURRENT WORK AND RESULTS

The 1978 camp was $64^{\circ}49'$N, $116^{\circ}05'$W on the isthmus between Deep Lake to the west and Staker Lake to the east. Work was concentrated in the western half of the claim block. Grids were constructed over much of this area at 120 m line intervals or less.

Geological mapping and prospecting, radiometric surveys, soil sampling of the grid areas, high density lake sediment sampling of one lake, a radon survey of a bog and trenching of uranium showings explored the area.

A total of 642 m of diamond drilling in 6 holes tested uranium showings occupying fractures in granitic rocks. One hole was on the LEVI claims at Wanda Lake, the remainder on the southern part of the explored area, south of Deep Lake.

Two holes intersected uranium mineralization. One of these, at Wanda Lake 2.5 km northeast of the camp, intersected 0.28% U_3O_8 across 1.38 m, as well as narrower intersections of less than 0.1% U_3O_8. The

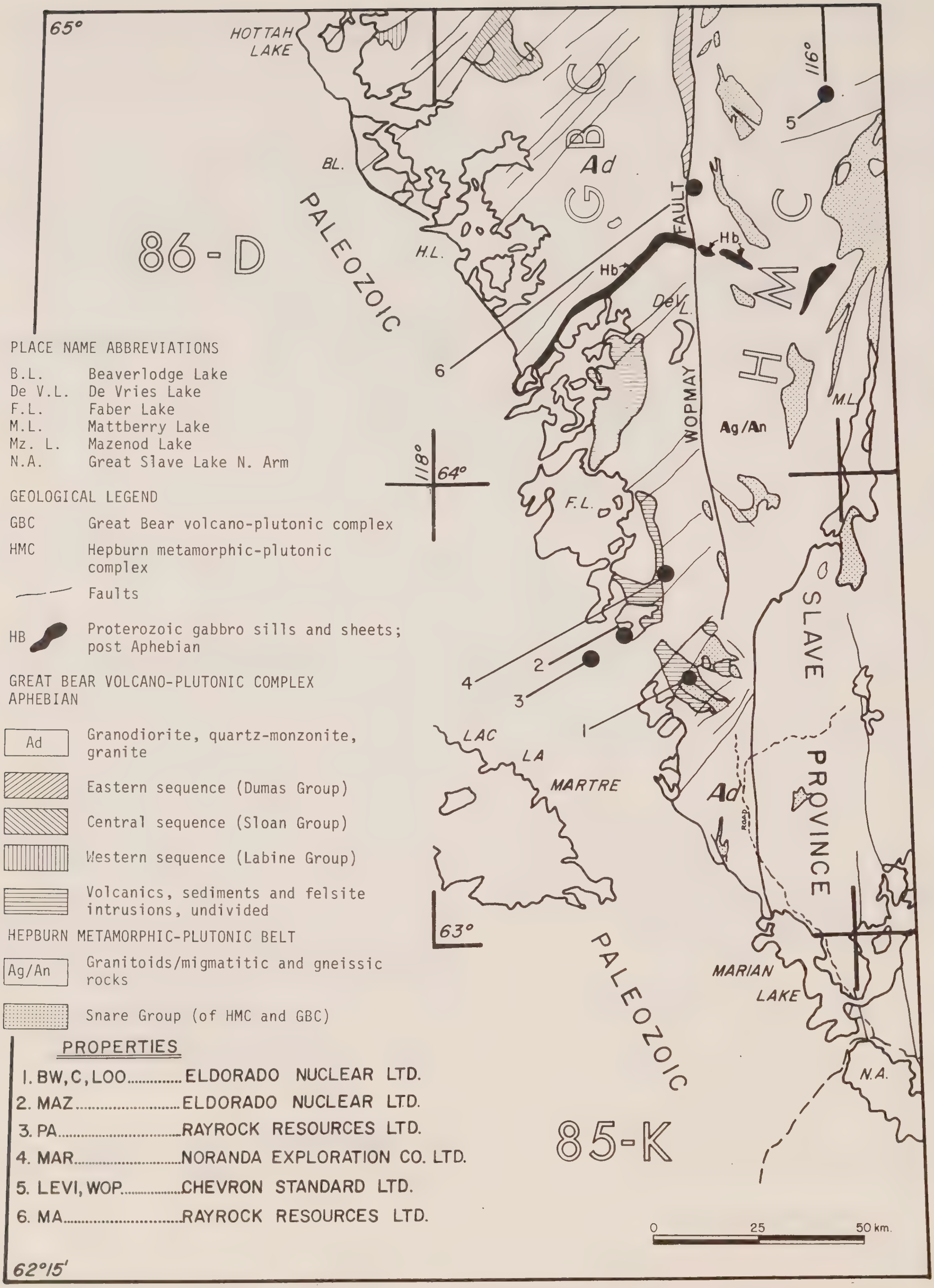


FIGURE VI-2: Property locations in the southern Great Bear volcano-plutonic complex and Hepburn metamorphic-plutonic complex.

other hole, roughly 2 km southeast of the camp, intersected 0.27% U_3O_8 across 0.61 m, and less than 0.1% U_3O_8 across 0.61 m in a separate intersection.

In this area uranium showings tend to be on or adjacent to northwesterly striking lineaments, commonly at fracture intersections, and are generally marked by hematitic alteration. Little coincidence between anomalous uranium content in soils and radiometric anomalies was found except at one point in the northern part of the explored area. A radon anomaly was outlined in a bog southwest of Wanda Lake.

A train of uraniferous glacial erratics extends westward from Deep Lake.

MA CLAIMS — Uranium
Rayrock Resources Limited — 86 C/10
1011-2200, Yonge Street, — 64°37'N, 116°43'W
Toronto, Ont., M4S 2C6

REFERENCES

Lord (1942); McGlynn (1964).

PROPERTY

MA 1-36.

LOCATION

The claims are 270 km northwesterly of Yellowknife and just west of the Wopmay River (Fig. VI-2).

HISTORY

In 1954 trenches were excavated and an unreported amount of diamond drilling performed in the northwestern corner of the area now occupied by the MA claims.

The property was recorded by V. Demski in 1977 and examined for the Ryowa-Rayrock joint venture in 1978.

DESCRIPTION

The property straddles the north trending Wopmay Fault, which for much of its length forms the boundary between the Great Bear volcano-plutonic complex and the Hepburn metamorphic-plutonic belt.

Five KR claims lie within the MA claim group.

CURRENT WORK AND RESULTS

Work consisted of geological mapping of the claims, detailed mapping of the old trenches and rock chip sampling to check visible mineralization in trenches and soil sampling.

Mapping showed the claims to be underlain by metasediments and metavolcanics of the Snare Group and granitoid rocks of the Hepburn metamorphic-plutonic belt. In the claim area the Wopmay Fault apparently consists of two subparallel breaks. The western break is marked by a quartz stockwork and roughly coincides with the western boundary of the property.

In the northwestern corner of the property uranium mineralization is concentrated where the quartz stockwork intersects intermediate volcanics of the Snare Group and, to a lesser extent, at the stockworks intersection with granitic rocks. The host rocks have been hematitized and silicified. Mineralization is secondary, weak and discontinuous.

STOAT CLAIMS — Uranium, Silver
Cansel River Silver Mines Ltd., — 86 F/12
c/o Howard Dixon & Co., — 65°37'N, 117°55'W
3rd floor, 330-5th Ave., S.W.,
Calgary, Alberta.

REFERENCES

Hoffman and others (1976); Murphy and Shegalski (1972); Padgham, Kennedy and others (1975); Padgham, Shegalski and others (1974); Seaton (1982).

PROPERTY

STOAT 5-18.

LOCATION

The property is roughly 395 km northwesterly of Yellowknife (Fig. VI-3). It is on the Camsell River and adjoins the east side of the LM claims (Seaton, 1982).

HISTORY

The claims were recorded in November, 1977.

DESCRIPTION

The claims are mainly underlain by syenite and granodiorite. The syenite outcrops southwest of a 1.3 km long lake in the central part of the property. The same area has been mapped on a smaller scale as "hornblende monzonite, syenodiorite and syenite" (Hoffman and others, 1976).

CURRENT WORK AND RESULTS

Geological mapping at 1:5,000 explored the claims.

A grid with an average spacing of 50 m between north-south lines was constructed over and adjacent to syenite outcrops in the southwestern part of the property. This grid was surveyed by geiger counter, as were the outcrops in the northeastern part of the property. No significant radiometric anomalies were outlined. A single anomalous reading was traced to a thin quartz-magnetite vein.

All plutonic rocks were mapped as syenite. Most outcrops are cut by northerly, easterly or northeasterly striking diabase dykes.

HIL, JIM, KIM, SIP CLAIMS — Uranium
B.P. Minerals Limited, — 86 K/5
Suite 1401, 25 Adelaide St. S.E., — 66°22'N, 117°47'W
Toronto, Ontario, M5C 1Y2.

REFERENCES

Hoffman (1978);Seaton (1982).

PROPERTY

HIL 1-12; JIM 1-15; KIM 1-34; SIP 1-22.

LOCATION

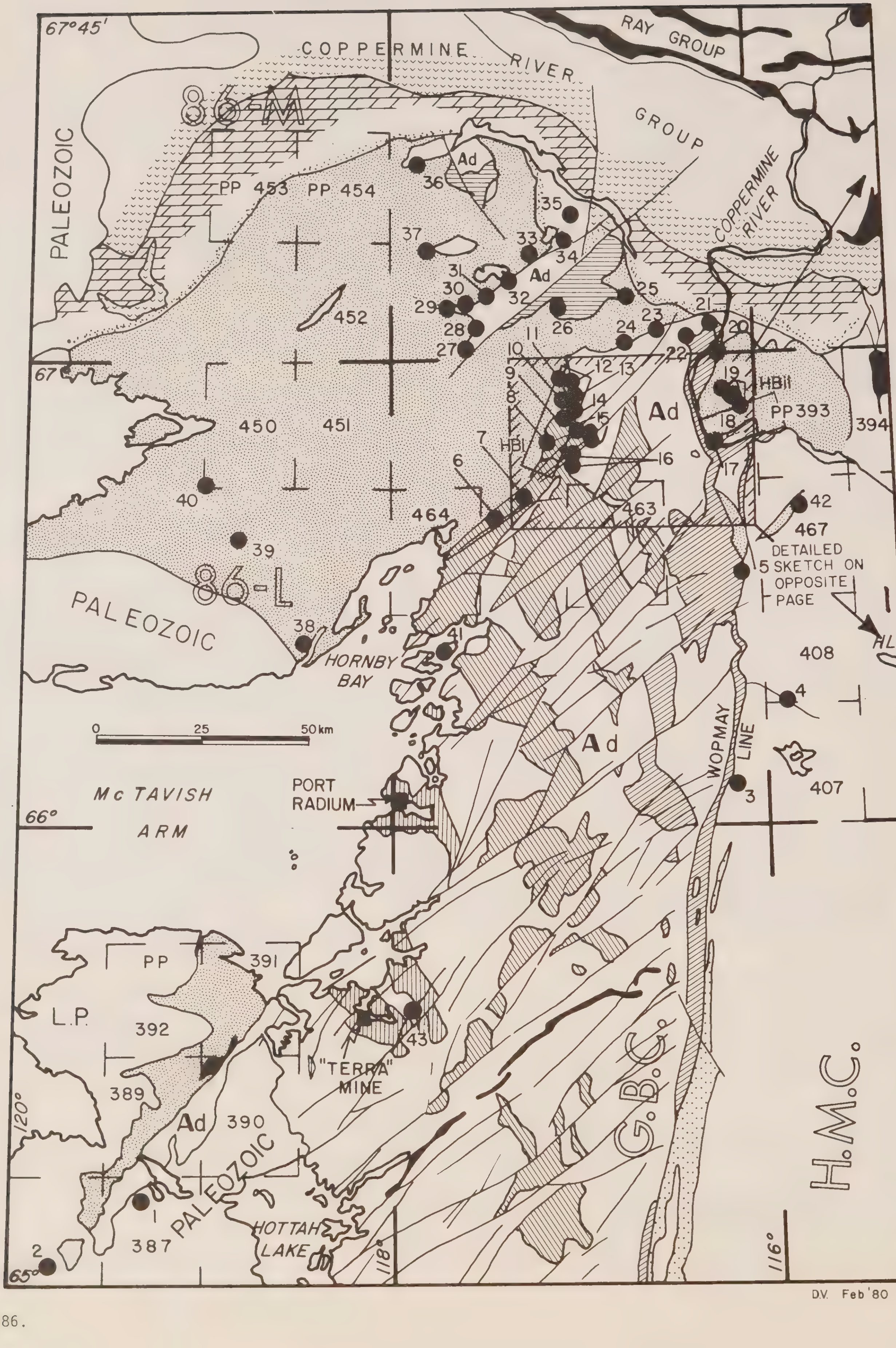
The claims are on Achook Island in the McTavish Arm of Great Bear Lake (Fig. VI-3). They are roughly 480 km north-northeasterly of Yellowknife.

HISTORY

All claims, except for KIM 1-34, were staked on 1976 to cover a geochemical anomaly (Hornbrook and others, 1976). The KIM claims were recorded in October, 1977. Prospectors in 1977 found five minor uranium showings (Seaton, 1982).

DESCRIPTION

The property is largely underlain by andesite


67°45'
COPPERMINE RIVER GROUP
RAY GROUP
86-M
PALEOZOIC
PP 453
PP 454
Ad
36
35
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19
HBII
PP 393
394
Ad
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464
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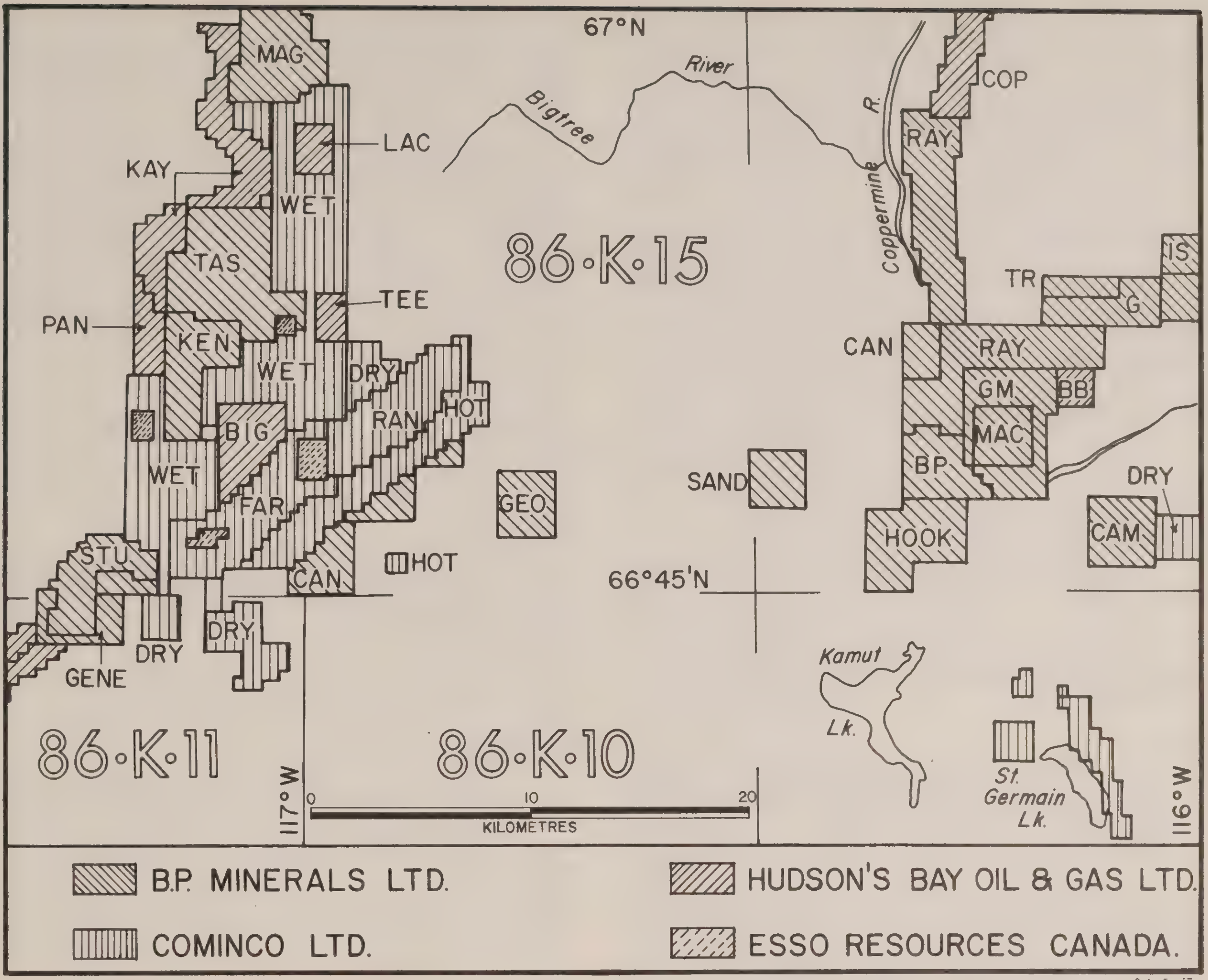
86-L
DETAILED SKETCH ON OPPOSITE PAGE
5
HL
PALEOZOIC
38
HORNBY BAY
41
408
4
0
25
50km
Ad
WOPMAY LINE
McTAVISH ARM
PORT RADIUM
66°
3
407
PP
391
L.P.
392
43
"TERRA" MINE
389
120°
Ad
390
PALEOZOIC
G.B.C.
H.M.C.
1
387
HOTTAH LAKE
2
65°
118°
116°
115°45'
D.V. Feb '80



CLAIMS/PROSPECTING PERMITS/PROJECTS

1. NAGA
2. MUT
3. PUB
4. KUM
5. HUD and PER
6. FAT
7. CAN, DRY
8. PAN, WET
9. KEN, TAS
10. PAN
11. KAY
12. LAC
13. WET
14. TEE
15. BIG, FAR, RAH
16. HOT
17. RAY
18. IS
19. BB
20. COP
21. SUN
22. ERK
23. BSD
24. JO
25. RUM
26. HAN
27. HIP
28. RAD
29. LAC, RAD
30. RAD
31. LAC
32. LAC, PAT
33. PAT
34. ML and YUK
35. BRUCE, JEFF, MIKE, ROD and TIM; MAL
36. MAL, SAN
37. BEM
38. H110-129) Hornby-Dease
39. H 65- 72) Project
40. H 75- 78)
JOHN
41. HIL, JIM, KIM, SIP
42. PAT
43. Northrim Mine, LM, STOAT

PP 463
PP 464
PP 467
PP 387, 389-392
PP 393-394
PP 450-454
HBi, ii, Hornby Bay Project (1977)

GEOLOGICAL LEGEND

PROTEROZOIC

HELIKIAN

DISMAL LAKES GROUP AND HORNBY BAY GROUP

Units 13-16 (Baragar and Donaldson, 1973). Mainly dolomite, some red mudstone in Unit 13.

11-13 Units 11-13: Sandstone and minor conglomerate (unit 11). Sandstone and intercalated black shale (unit 12).

Units 8-11. Sandstone, conglomerate shale, dolomite, Contact between lower sandstone-shale units and upper predominantly dolomite units not shown.

For remainder of geological legend see Figure VI-2 and Baragar and Donaldson (1973).

For regional geology of Hepburn metamorphic-plutonic belt (H.M.C.) see Hoffman (1978). HL Hepburn Lake.

Figure VI-3: Northern Great Bear volcano-plutonic complex, Hepburn metamorphic-plutonic complex and Amundsen Basin with property locations.

and rhyolite lava flows and ignimbrites of the Labine Group. Smaller areas are underlain by the intrusive Mulligan Porphry and volcanoclastics. The southwestern corner of the property is underlain by granodiorite of the Hogarth Pluton (Hoffman, 1978). A northeasterly striking fault forms splays which diverge southwesterly through the claims, to converge with a parallel zone of northeasterly faulting in the western part of the property.

CURRENT WORK AND RESULTS

Work included geological mapping of the claim group and of four grids. Prospecting, scintillometer and alphameter surveys explored the grids, three of which were located along fault zones with locally coincident radioactive anomalies.

PROSPECTING PERMIT 463	Uranium
Hudson's Bay Oil and Gas Company Limited,	86 K/10
700-2nd Street S.W.,	66°30' - 66°45'N
Calgary, Alta., T2P 2W1	116°30' - 117°00'W

REFERENCES

Hoffman (1978); Hornbrook and others (1976b); Seaton (1982).

LOCATION

The permit area is centred about 480 km north-northwesterly of Yellowknife and straddles the Sloan River (Fig. VI-3).

HISTORY

The McLaren Lake copper showing in the central part of the permit area was discovered by Dominion Explorers Limited in 1931 and later explored by Anaconda Petroleum Limited in 1968.

Prospecting Permit 463 was granted to Hudson's Bay Oil and Gas Company in March, 1977. During 1977 work included a helicopter-borne gamma-ray spectrometer survey, lake bottom spectrometry, reconnaissance geological mapping, lake sediment and lake water sampling (Seaton, 1982). After conclusion of this work roughly 25% of the permit area was released. The released portions are in the southern half of 86 K/10 and in the northeastern corner of the original permit area. Within the latter area roughly 10 sq. km were retained at Kamut Lake.

DESCRIPTION

The permit area lies towards the northern end of the Great Bear volcano-plutonic complex and is mainly underlain by volcanics of the Sloan Group and granitoid rocks of the Spence, Junius and Torrie plutons (Hoffman, 1978). Small areas near Jaciar and Kamut Lakes are underlain by volcanics and volcanogenic sediments of the Dumas Group.

CURRENT WORK AND RESULTS

Airborne radiometric surveys explored three grid areas; the first northeast of the northern arm of McLaren Lake, the second at Kamut Lake and the third in the permit area near Jaciar Lake. Anomalies were detected in all three areas.

Detailed geological mapping covered the three areas explored by airborne radiometrics. Ground surveys near Jaciar Lake included radiometrics, horizontal loop EM, IP-resistivity and trenching.

Lake waters and sediments were collected from several lakes in the permit area during a wider survey which covered parts of 86 K, L and N. Lake waters were analyzed for uranium; lake sediments for uranium, copper, lead, zinc, nickel and arsenic. Uranium and base metal anomalies were detected.

In the Jaciar Lake area and at McLaren Lake, uranium mineralization is in quartz veins which form part of giant northeasterly trending quartz veins and stockworks. In the Kamut Lake area a minor uranium showing was found in sandstone preserved as roof pendants in a granodiorite-quartz monzonite pluton. The roof pendants are near a giant quartz vein. Uranium leached from the roof pendants is presumed to have formed the geochemical anomaly in a nearby bog.

WOPMAY OROGEN-AMUNDSEN BASIN

PROSPECTING PERMITS 470-475	Uranium
B.P. Minerals Limited	86 J/10,11
Suite 1401-25 Adelaide St. E.,	66°30' - 66°45'N
Toronto, Ont., M5C 1Y2	114°30' - 115°30'W

REFERENCES

Easton (1980); Findlay and Smith (1966); Hoffman (1980a, b); Hoffman and others (1978, 1980); Kerans and others (1981); Smith (1967); St.-Onge and Hoffman (1980).

PROPERTY

Prospecting Permits 470, 471, 472, 473, 474, 475.

LOCATION

The centre of the area is roughly 470 km northerly of Yellowknife between the Coppermine River and Muskox Lakes (Fig. VI-1). The two northern Permits, 474 and 475, cover 86 J/10, NW and 86 J/11, NE respectively. The adjoining southern Prospecting Permits 470 to 473 cover 86 J/10, SE, 86 J/10, SW, 86 J/11, SE and 86 J/11, SW. The Coppermine River flows northwest through Prospecting Permit 470, 471 and 474 and west-northwesterly through Prospecting Permit 475.

HISTORY

All the prospecting permits were acquired on January 1, 1978; the two northern permits by B.P. Minerals Limited and the four southern ones by Union Carbide Canada Limited. The permits were explored by B.P. Minerals as exploration operator.

DESCRIPTION

West of the Muskox Intrusion the prospecting permits are underlain by granitoid rock of the Hepburn Batholith and by metasediments and metavolcanics into which the batholith has been intruded. Felsic and mafic metavolcanics and metasediments of the Akaitcho Group flank the Hepburn Batholith to the west and Epworth Group metasediments are exposed on its east side.

The Muskox Intrusion (Findlay and Smith, 1965; Smith, 1967), the age of which has recently been reviewed (Hoffman, 1980), consists largely of ultramafic and mafic rocks and granophyre and trends north-northwesterly through Prospecting Permits 472 and 475. South of the Coppermine River it ranges from less than 100 m to(more commonly)200 m wide. North of the Coppermine River it is exposed over a width of roughly 1,000 m on Prospecting Permit 475.

To the east of the Muskox Intrusion metasediments of the Epworth Group (Fraser, 1974;

Hoffman and others, 1978; St. Onge and Hoffman, 1980) are displaced by the north-northwesterly trending, easterly verging Marceau Thrust. The andalusite isograd is not displaced by the thrust indicating that metamorphoism related to the emplacement of the Hepburn Batholith post-dated the thrusting. Ten to fifteen km east of the Marceau thrust, pillowed basalts of the Vaillant Formation overlain by cherty stromalitic dolomite of the Stanbridge Formation are exposed in the core of the Cloos Anticline (Hoffman and others, 1978). East of the Cloos Anticline lies the Asiak Fold and Thrust Belt, composed of relatively unmetamorphosed sediments of the Epworth Group including clastics of the Odjick and Recluse Formations and carbonate sediments of the Rocknest Formation. The black carbonaceous and pyritic Fontano Formation, best developed west of the Cloos Anticline where it overlies the Odjick Formation, is reduced to a much thinner unit overlying the Rocknest Formation east of the anticline. The carbonaceous and pyritic nature of the Fontano Formation may have significance in uranium exploration.

North of the Coppermine River and east of the Muskox Intrusion on Prospecting Permits 474 and 475 an outlier of Hornby Bay Group sediments, presumably of the Bigbear fluvial system (Kerans and others, 1981), abuts the northwesterly trending Sinister Fault. The outlier is on the southwest side of the fault; a strike slip fault with a later dip slip component.

CURRENT WORK AND RESULTS

Lake sediments were collected throughout the six prospecting permits, through the adjoining map area 86 J/11 NW, and through the south and western marginal areas of 86 J/10 NE. Average sample density was 1 sample per 1.3 km^2. Samples were analysed for uranium, copper, lead, nickel, cobalt, silver and manganese. Conductivity of lake water was measured at each sample site. Fluorimetric uranium analyses were made both directly on a 4N nitric acid leach and on an organic phase extract from the leachate. Sample analyses were processed statistically and plotted on reconnaissance scale geological maps in a size coded symbol format.

Numerous anomalies were detected and zones anomalous in uranium, base-metals, or both were outlined. The anomalies were variously and provisionally attributed to lithologies with presumed high backgrounds for certain metals (e.g. pillow lavas with high nickel, cobalt and lead contents), to possible fault-related small vein deposits or to possible unconformity related mineralization near the outlier of Hornby Bay Group sediments.

PROSPECTING PERMITS 393, 394, 467 and *PAT CLAIMS*	Uranium 86 J/12,13,14
B.P. Minerals Limited, Suite 1401-25 Adelaide St. E., Toronto, Ontario M5C 1Y2.	$66^{o}30' - 67^{o}00'$N $115^{o}08' - 116^{o}00'$W

REFERENCES

Easton (1980); Findlay and Smith (1966); Hoffman (1980 a,b); Hoffman and others(1978,1980) Kerans and others (1981); Seaton (1982); Seaton and Hurdle (1978); Smith (1967); St.-Onge and Hoffman (1980).

PROPERTY

Prospecting Permits 393, 394 and 467; PAT 1-449.

LOCATION

The centre of the area is roughly 480 km northnorthwesterly of Yellowknife (Fig. VI-1). The Coppermine River flows east-northeasterly to easterly through the northern part of the area. Prospecting Permit 467 and the PAT claims are on NTS sheet 86 J/12; Prospecting Permit 393 on 86 J/13 and Prospecting Permit 394 on 86 J/14. McGreggor Lake, which is underlain by the Muskox Intrusion, lies in the centre of 86 J/14.

HISTORY

Prospecting Permits 393 and 396 were granted to B.P. Minerals in 1976 and explored by geological mapping, geochemical and geophysical surveys in 1977 (Seaton, 1982).

The PAT claims were acquired in December, 1976 and the surrounding ground to the east, west and south was granted to B.P. Minerals as Prospecting Permit 467 in 1977. During 1977 the claims and permit area were explored by geological mapping, radiometric prospecting and geochemical surveys (Seaton, 1982).

DESCRIPTION

The area is mainly underlain by Aphebian rocks of the Hepburn metamorphic-plutonic belt, locally overlain unconformably by Helikian sediments of the Hornby Bay Group. The Helikian Muskox intrusion (Findlay and Smith, 1965; Smith, 1967), the age of which has recently been reviewed by Hoffman (1980b), borders the area to the northeast.

Rocks of the Dumas Group (Hoffman, 1978) underlie a relatively small area in the west of Prospecting Permit 393.

The Aphebian rocks include rhyolitic and basaltic volcanics and sediments of the Akaitcho Group (Easton, 1980; Hoffman and others, 1978). The Wentzel and Hepburn batholiths consist largely of granitoid rocks with subordinate gabbros intruding both the Akaitcho Group and the overlying Epworth Group rocks. The batholiths were emplaced during folding which followed thrusting (Hoffman and others, 1980). Studies of metamorphism (St-Onge and Hoffman, 1980) around Wentzel and Hepburn batholiths show inversion of the isograd sequence ("hot-side-up" and "hot-side-down") indicating that the batholiths may be, in part, sheet-like bodies which have metamorphised both overlying and underlying rocks.

Late conjugate (northeasterly and northwesterly trending) strike-slip faults displace the Aphebian rocks (Hoffman, 1980a). Syndepositional dip-slip reactivation of these faults during Helikian time affected the distribution of the Hornby Bay and Dismal Lakes Group sediments. In this area the Hornby Bay Group consists of sediments of the Bigbear fluvial system (Kerans and others, 1980). The main faults in the area are the northeasterly striking Zephyr Fault which crosses Prospecting Permit 467 and the PAT claims (86 J/12), and the northwesterly striking Sinister Fault which crosses Prospecting Permit 394. Both of these faults have affected the present distribution of the Hornby Bay Group rocks. The Zephyr Fault forms the northwestern wall of a 4 km wide graben filled with Hornby Bay Group sediments. Late post-Hornby Bay Group northerly striking extensional faults bound the Mouse Graben (NTS 86 J/13, 14).

CURRENT WORK AND RESULTS

Workers detected several uranium showings and numerous radioactive occurrences. Among these are the Munch, FC and Tabb showings on Prospecting Permit 394, two small showings (discovered in 1978) on

Prospecting Permit 393, three showings (the J, Spark and Mike on the PAT claims), two showings in the east central part and one in the southwestern part of Prospecting Permit 467. Showings are hosted by a variety of rock types mostly but not exclusively in the Aphebian basement. These rocks include supracrustals and plutonics. Fractures related to fault zones are generally the loci of pitchblende or secondary uranium minerals. Sulphides (mainly pyrite and chalcopyrite) and graphite appear to indicate local reducing environments under which pitchblende was, in some cases, precipitated. Several showings are now only marked by secondary uranium minerals and anomalous radioactivity.

One base metal showing - mainly galena - lies roughly 2 km east of Munch Lake. Munch Lake at the the northern end of the Munch-FC grid is the site of a diamond drilling camp.

The geology of Prospecting Permit 393 was mapped at 1:30,000 and of Permit 394 at 1:20,000.

An airborne survey comprising radiometrics, magnetometer and VLF-EM covered parts of Prospecting Permit 393.

On Prospecting Permit 393, 1:10,000 geological mapping, magnetometer, VLF-EM and alphameter surveys explored the West Track Etch Grid (66°53'N, 115°35'W), and the East Wolf and Mag Grids (centered at 66°53'N, 115°55'W). The East Wolf and Mag grids cover the 3T and Mag uranium showing respectively. The Flow showing at 66°48'N, 115°52'W was explored by 1:1000 geological mapping.

On Prospecting Permit 394, the Bear Grid (66°58'N, 115°24'W) which covers the Bear Uranium showing was explored by 1:960 geological mapping, magnetometer VLF-EM surveys and seven diamond drill holes. On the East Track Etch Grid (66°52'30"N, 115°28'W) magnetometer, VLF-EM, and alphameter surveys and one diamond drill hole were completed. On the Munch-FC Grid (66°52'N, 115°23'W) which covers the Munch and FC uranium showings, magnetometer VLF-EM and alphameter surveys were completed. Soil sampling delineated several geochemical anomalies in the Munch Lake (66°55'N, 115°25'W) area. One strong multi-element anomaly was outlined around the Bear showing. Uranium, copper, lead, cobalt and nickel contents of soils were determined; pH and scintillometer measurements were made at each sampling site.

Prospecting Permit 467 and the PAT claims were geologically mapped at 1:30,000. Mapping at 1:5,000 covered the J, Spark and Mike uranium showings, 200 m to 750 m north of a small lake near the centre of the PAT claims at 66°42'N, 115°45'W.

Lake sediment sampling on 86 J/12 was confined to the northern part of Prospecting Permit 467. Soil sampling explored a large geochemical anomaly on the PAT claims. Lake sediment and soil sampling detected and outlined geochemical anomalies. Lake sediment samples were analysed for uranium, copper, nickel, cobalt, lead and manganese, and pH and conductivity were determined. Soil samples were analysed for uranium and copper and scintillometer counts recorded for each sampling site.

HUD and PER CLAIMS	Uranium
Hudson's Bay Oil and Gas Company Limited,	86 J/12, 86 K/9
700-2 Street S.W.	66°33'N, 116°03'W
Calgary, Alberta, T2P 0X5	

REFERENCES

Easton (1980); Hoffman (1978); Hoffman and others (1978, 1980); Kerans and others (1981); Seaton 1978, 1982); Seaton and Hurdle (1978).

PROPERTY

HUD 1-4; PER 1-99

LOCATION

The contiguous HUD and PER claim blocks are just south of Perrault Lake, roughly 460 km north-northwesterly of Yellowknife (Fig. VI-3).

HISTORY

The claims were staked in 1977 (Seaton, 1982). Preliminary geological mapping and lake sedimnt and water sampling explored the claims.

DESCRIPTION

The PER and HUD claims cover part of the southern end of an outlier of Hornby Bay Group sediments of the Bigbear fluvial system (Kerans and others, 1981). To the west on the PER claims the sediments overlie the Dumas Group. Biotite-hornblende granitic gneiss of the Wentzel Batholith and migmatitic rock including turbidites of the Akaitcho Group outcrop east of the Wopmay Fault on the HUD claims.

CURRENT WORK AND RESULTS

Geological mapping at 1:15,840 of the property was completed in 1978.

An airborne radiometric survey covered the claims and smaller adjoining areas to the northwest and south. Thirteen anomalies were detected. Reconnaissance I.P. explored parts of the HUD and PER claims. Lake sediment and water sampling was continued.

TAIHEI PROJECT, FAR, RAH and WHIMP CLAIMS	Uranium
Cominco Limited,	86 K/1,11,14,15
200 Granville Square,	86 N/2,3;
Vancouver, B.C. V6C 2R2	86 O/3,4
	66°05' - 67°05'N,
	115°15' - 117°20'W

REFERENCES

Baragar and Donaldson (1973); Durham (1977); Hoffman (1978); Hoffman and McGlynn (1977); Kerans and others (1981); Seaton (1978; 1982); Seaton and Hurdle (1978).

PROPERTY

DRY 1-204; FAR 1-110; FLIP 1-9; FLOP 1-12; HOT 1-135; MED 1; PUB 1-27; RAH 1-103; WET 1-443; WHIMP.

LOCATION

Cominco's Taihei Project includes a large number of claims most of which lie immediately north of the FAR and RAH claims, roughly 500 km north-northwesterly of Yellowknife. Small satellite properties include the FLIP, FLOP and MED claims some 50 km to the northeast, the PUB group roughly 60 km to the southeast, and two outlying groups of DRY claims (DRY 89-113 and DRY 64-88) northeast and southwest of Saint Germain Lake respectively (Fig. VI-3).

HISTORY

Following lake water sampling in 1976, the RAH claims were staked to cover a showing of pitchblende. A larger area was explored and the numerous claim groups of the Taihei Project staked (Seaton, 1982; Seaton and Hurdle, 1978).

DESCRIPTION

The project has been reported in previous Mineral Industry Reports. References covering the regional geology are also given.

The project area is largely underlain by rocks of the Great Bear volcano-plutonic complex and fluvial sediments belonging mainly to the Fault River System (Kerans and others, 1981).

The RAH pitchblende showing is hosted by biotite granite which outcrops on the southeastern flank of a small graben filled with Hornby Bay Group sediments.

CURRENT WORK AND RESULTS

Seven holes, totalling 1,204 m, were drilled on the RAH claims. The holes range in length from 104 m to 223 m. Four holes intersected the unconformity at the base of the Hornby Bay sandstone which fills the RAH graben. Two holes cut the southern boundary fault of the graben. Only one hole encountered uranium mineralization and this was close to and on strike with the RAH showing.

A detailed ground radiometric survey tested a 6 sq. km area on the RAH claims northeast of the Rah showing.

A radon survey over parts of the FAR and RAH claims, outlined a 1,000 m by 150 m anomaly in a muskeg covered area at the south end of Far Lake.

VLF-EM explored structures along the northeasterly trending RAH graben on the FAR and RAH claims. A magnetometer survey explored the northeastern part of this area. The VLF survey confirmed structures mapped geologically. The magnetometer survey provided little useful information.

Geological mapping refined work done in 1977 and regional geological mapping of the HOT, WET and DRY claims peripheral to the FAR and RAH claims was completed.

Ground checking of anomalies detected by airborne radiometrics over the FAR and RAH claims and surrounding ground (Seaton, 1982) did not find any more uranium showings.

Two small outliers of Hornby Bay sandstone on the WET claims 11 km and 15 km north-northwest of the Rah showing were checked by radon surveys. Only weak single point anomalies were detected.

The MED-FLOP claim block (86 O/3) was staked on inferred subcropping Hornby Bay Group sandstone or quartzite, intruded by the Muskox Intrusive complex. On the claims bedrock geology is hidden by thick glacial deposits. The geology of the surrounding area was mapped on a reconnaissance scale. A radon cup survey of the claims did not detect anomalies.

The FLIP claims (86 O/4) cover an outcrop of Hornby Bay Group sandstone and diabase. Dismal Lakes Group sandstone and dolomite were mapped immediately to the north of the claims. Prospecting encountered low radioactivity but no mineralization.

DRY 64-88 (86K/9, SW) and DRY 89-113 (86 K/9, NE) lie south and north respectively of Cominco's CANINE-COMUR claim block (Seaton, 1978) and were staked to cover lake water uranium anomalies reported by the Geological Survey of Canada (Durham, 1977). Mapping by Cominco revealed DRY 64-88 to be underlain by shales, greywackes and andesites of the Dumas Group of the McTavish volcanics (Hoffman, 1978), by quartz-feldspar porphyry and by the coarse golfball porphyry which also outcrops on Cominco's property at Saint Germain Lake. DRY 89-113 are underlain by gneissic granitoid rocks of the Wentzel Batholith. The western margin of the claim block is underlain by chlorite schist, andesite and polymictic conglomerate; the volcanics and sediments presumably belong to the Dumas Group. No mineralization was found on either claim block.

The PUB claims (86 K/1) were staked in 1977 to cover an anomaly detected by a 1976 airborne radiometric survey. Mapping showed the claims to be underlain by sediments and volcanics of the Dumas Group and intrusive granitoid rocks. Ground radiometric, radon and detailed geological surveys explored a grid in the northwestern part of the claims. In this area secondary uranium minerals were found in 1978 coating fractures exposed by 1977 trenching. The mineralization appears to be stratabound. A 10 cm wide carbonate vein, near a syenite plug in the western part of the claims contains minor uranium.

HEN, KAY and RC CLAIMS	Uranium
B.P. Mineral Limited,	86 K/5
Suite 1401, 25 Adelaide St. E.,	66°25'N, 117°53'W
Toronto, Ontario, M5C 1Y2	

REFERENCES

Hoffman (1978); Hornbrook and others (1976 b) Kerans and others (1981).

PROPERTY

HEN 1-89; KAY 1-6; RC 1-9.

LOCATION

The claims are on Doghead Peninsula at Great Bear Lake, roughly 490 km north-northwesterly of Yellowknife. They extend from Hornby Bay on their western margin to Western Channel at their southeastern boundary (Fig. VI-3).

HISTORY

The HEN and RC claims were recorded in late 1976 to cover lake sediment anomalies on the Doghead Peninsula (Hornbrook and others, 1976 b) The KAY claims were staked in early 1978.

DESCRIPTION

The HEN and KAY claims are mainly underlain by dacite ignimbrite of the Sloan Group (Hoffman, 1978). Sediments of the Hornby Bay Group unconformably overlie the Sloan Group ignimbrites at and near Elizabeth Lake in the northern part of the KAY claim block (Kerans and others, 1981). Lithic rich felsic ignimbrites of the Labine Group, minor intrusive Harrison Porphyry, alluvial conglomerate and lithic arenite underlie the RC claims.

A fault trends northeasterly through the HEN and RC claims. Near the northeast corner of the HEN claims a splay fault diverges southwestwards from this fault zone and strikes east-northeasterly through Elizabeth Lake.

CURRENT WORK AND RESULTS

Geological mapping at 1:10,000 covered the HEN and RC claims.

Scintillometer prospecting explored the property.

Soil samples from the HEN and KAY claims were analyzed for uranium, copper, nickel and lead. Soil pH was determined for each sample, and scintillometer readings were taken at each sampling station. Six rock chip samples were analyzed for uranium.

Two large zones with soils anomalous in uranium and other metals were delineated. One of these is in the central part of the HEN claims and correlated with several areas of anomalous radioactivity. The other zone is at the Aphebian-Helikian unconformity.

CAN and FAT CLAIMS	Uranium
PROSPECTING PERMIT 464	86 K/11,12
Hudson's Bay Oil and Gas Company Limited	$66^{o}30'$N - $66^{o}45'$N,
700-2nd Street S.W.,	$117^{o}14'$ - $118^{o}00'$W
Calgary, Alta., T2P 2W1.	

REFERENCES

Craig (1960); Hoffman (1978); Hoffman and McGlynn (1977); Hornbrook and others (1976b); Kerans and others (1981); Seaton (1982).

PROPERTY

CAN 1-9; FAT 1-143, 164-151; Prospecting Permit 464.

LOCATION

The properties are roughly 500 km north-northwesterly of Yellowknife and 80 km north-north-eastly of Port Radium (Fig. VI-3). The CAN and FAT claims are on 86 K/11 and Prospecting Permit 464 on 86 K/12.

HISTORY

The CAN and FAT claims were staked in 1977. Prospecting Permit 464 was granted in March, 1977 (Seaton, 1982).

During 1977 the FAT claims and Prospecting Permit 464 were geologically mapped and prospected. Airborne EM and radiometric surveys explored part of the FAT claims and the prospecting permit area. Lake sediments and lake waters were sampled (Seaton, 1980).

Roughly 25% of Prospecting Permit 464 was released on April 1, 1978.

DESCRIPTION

Prospecting Permit 464 and the CAN and FAT claim block straddle the Fault River fault, along which Aphebian rocks of the Great Bear volcano-plutonic complex are in contact with Helikian sediments of the Hornby Bay Group (Hoffman, 1978; Kerans and others, 1981).

CURRENT WORK AND RESULTS

Geological mapping of the FAT claims was completed in 1978 and extended to cover the CAN claims. A geological map of Prospecting Permit 464 was completed.

Prospectors discovered a uranium showing near the centre of the FAT claims, on FAT 73. The showing is in silicified quartz veined Aphebian basement rock which is locally capped by regolith.

An airborne radiometric survey explored the CAN and FAT claims and a smaller adjoining area to the northwest. Several anomalies were reported. A reconnaissance IP and resistivity survey explored the Aphebian-Helikian contact along the Fault River on the CAN and FAT claim block and on the adjoining part of the permit area. A few widely spaced lines extended this survey to the northwest into ground underlain by the Hornby Bay Group. Higher chargeabilites were found along the zone of shearing and regolith development near the Fault River. Higher chargeabilities were not associated with lower apparent resistivities, nor with disseminated sulphides.

Lake bottom radiometric surveying was continued on Prospecting Permit 464.

Lake water and lake sediment sampling was continued during 1978 on the CAN and FAT claims and on Prospecting Permit 464. Lake waters were analyzed for uranium, and lake sediments for uranium, copper, lead, zinc, nickel and arsenic and in a few cases for molybdenum.

A few uranium anomalies were reported. The geochemical survey was part of a larger regional survey covering parts of 86 K, L and N.

BESS, BP, G, GM, IS, MAC, RAY and TR Claims,	Uranium
B.P. Mineral Limited,	86 K/14
Suite 1401-25 Adelaide St. E.,	66°51'N, 116°15'W
Toronto, Ontario M5C 1Y2	

REFERENCES

Hoffman (1978); Hoffman and others (1980); Kerans and others (1981); Seaton (1982).

PROPERTY

BESS 1; BP 1-61; G 1-156; GM 1-110; IS 1-20; MAC 1-36; TR 1-18; 238 RAY claims.

LOCATION

The properties form a single block of claims at and near the Big Bend of the Coppermine River, roughly 800 km north-northwesterly of Yellowknife (Fig. VI-3).

HISTORY

G 1-72, the GM and MAC claims were recorded in the fall of 1976. Eighteen of the RAY claims were recorded in January, 1977; the remaining RAY claims, G 73-156, the IS and TR claims were recorded in the fall of 1977. The BESS claim was staked in 1978.

The initial staking in 1976 followed regional geological reconnaissance and geochemical surveys by B.P. Minerals of ground adjoining the Aphebian-Helikian unconformity in the northern Bear Province.

In 1977 an airborne radiometric, EM and magnetometer survey (part of the Hornby Bay Project - Seaton, 1982) covered the claim area and part of Prospecting Permit 393 on 86 J/13. The 1977 ground work consisted largely of prospecting of the area flown and soil sampling. Soils collected in 1976 were analysed for uranium, copper, lead, cobalt, nickel and manganese; those collected in 1977 for uranium and copper. One uranium showing was discovered on the MAC claims and four in the northern part of the G claims.

DESCRIPTION

The area is mainly underlain by Aphebian hornblende-biotite adamellite of the Saint Germain pluton and felsic ignimbrites and lava flows of the Dumas Group (Hoffman, 1978), unconformably overlain by Helikian sediments of the Hornby Bay Group. These have been assigned to the Bigbear fluvial system (Kerans and others, 1981). Glacial drift, covering substantial areas and locally attaining considerable thickness, obscures the northern end of the Wopmay Line which projects northward roughly along longitude 116°.

Because the Wopmay Line separates two geological subdivisions of the Wopmay orogen, Prospecting Permit 393 (86 J/13), which lies east of the Wopmay Line, is discussed under a separate heading, even though contiguous with the claim block under discussion and explored as part of the same program.

CURRENT WORK AND RESULTS

Three geochemical anomalies on the BP claims, two on the G claims, three on the GM claims and five on the RAY claims were selected for follow-up surveys. These surveys included additional geological mapping, prospecting, resampling at anomalous sites and rock chip sampling.

A detailed grid scintillometer survey covered a small part of the G claims. Trenching explored the showing on the MAC claims. Trench samples were analysed for uranium, copper, manganese, iron and magnesium.

BIG CLAIMS	Uranium
Hudson's Bay Oil and Gas Company Limited,	86 K/14
700-2nd St., S.W.	66°51'N, 117°03'W
Calgary, Alberta,	
T2P 2W1	

REFERENCES

Hoffman (1978); Kerans and others (1981); Seaton (1982).

PROPERTY

BIG 1-53

LOCATION

The claims are roughly 500 km north-north-westerly of Yellowknife and 35 km northeasterly of Hornby Bay (Fig. VI-3).

HISTORY

The BIG claims were staked in April, 1977.

During 1977 geological reconnaissance mapping, airborne radiometrics and geochemical surveys explored the claims and surrounding area (Seaton, 1982).

DESCRIPTION

The BIG claims are largely underlain by Aphebian volcanics (Hoffman, 1978). Hornby Bay Group sediments (Kerans and others, 1981) fill a small northeasterly trending graben in the western part of the claims block.

CURRENT WORK AND RESULTS

Geological mapping explored the claims in greater detail in 1978. A small uranium-copper occurrence in sheared dacitic volcanics was discovered near the northeastern corner of the property.

An airborne radiometric survey explored the claims along northeast and southwest lines 100 m apart. Anomalies detected were weak.

Lake sediment and lake water sampling continued during 1978. Lake waters were analysed for uranium and lake sediments for uranium, copper, lead, zinc, nickel and arsenic.

An IP-resistivity survey did not find any anomalies over the buried Aphebian-Helikian unconformity, but did show a weak chargeability anomaly and low resistivity associated with the uranium-copper showing in the northeastern corner of the claim.

GENE and STU CLAIMS	Uranium
B.P. Mineral Limited,	86 K/14
Suite 1401, 25 Adelaide St. E.,	66°45'N, 117°12'W
Toronto, Ontario., M5C 1Y2.	

REFERENCES

Hoffman (1978); Kerans and others (1981).

PROPERTY

GENE 1-22; STU 1-62.

LOCATION

The claims are on the Fault River, roughly 510 km north-northwesterly of Yellowknife and 30 km northeast of Hornby Bay (Fig. VI-3).

HISTORY

During 1976 B.P. Minerals explored the Helikian-Aphebian unconformity in the northern Bear Province by reconnaissance geological mapping, prospecting, lake sediment and soil sampling and by airborne radiometrics. As a result of this work the GENE and STU claims were recorded in the fall of 1976.

In 1977 reconnaissance geological mapping at more detailed scale (1:31,680) of the Aphebian rocks near the northern margin of the Great Bear volcano-plutonic complex was combined with prospecting and soil sampling of geochemical anomalies detected in 1976. A 1977 regional airborne survey comprising EM, magnetometer and radiometrics covered parts of 86 K/11 and 86 K/14, including the GENE and STU claims.

DESCRIPTION

Roughly a third of the property lies northwest of the Fault River fault. The Aphebian rocks, which outcrop both sides of the fault, consist largely of felsic ignimbrites of the Sloan Group (Hoffman, 1978).

The Helikian rocks which outcrop on the STU claims in the northwestern part of the property are conglomerates and sandstones of unit 8 of the Hornby Bay Group and belong to the Fault River fluvial system (Kerans and others, 1980).

CURRENT WORK AND RESULTS

During 1978, 1:10,000 geological mapping covered that part of the STU claims which lies northwest of the Fault River fault, and also a roughly 600 m wide strip on the southeast side of the fault, where trachyte crystal tuff was mapped.

A manganese showing (one of those explored by Eldorado Mining and Refining Limited and Canadian Nickel Company Limited in 1959 and 1960) lies just outside the western margin of the STU claims and just southeast of the Aphebian-Helikian unconformity. Anomalous radioactivity is locally coincident with manganese mineralization. Regolith caps a few of the outcrops nearby.

Prospecting and alphameter surveying failed to find a source for strong uranium anomalies on the STU claims. The uranium anomalies are commonly coincident with enhanced copper, cobalt, nickel, lead, molybdeneum and manganese contents, but not with anomalous radioactivity.

KAY and PAN CLAIMS	Uranium
Hudson's Bay Oil and Gas	86 K/14
Company Limintd,	66°55'N, 117°08'W
700 - 2nd St., S.W.	
Calgary, Alberta,	
T2P 2W1	

REFERENCES

Hoffman (1978); Kerans and others (1981); Seaton (1982).

PROPERTY

113 KAY claims; PAN 1-28.

LOCATION

The claims are roughly 510 km north-northwesterly of Yellowknife and 100 km north-northeasterly of Port Radium (Fig. VI-3).

HISTORY

The KAY claims were staked in April, 1977 and the PAN claims about three months later.

Reconnaissance geological mapping, prospecting and airborne gamma ray spectrometry explored the claims. Lake water and lake sediment sampling covered a larger area including the claims.

A combined airborne EM (Input) and magnetometer survey explored an area which included the KAY and PAN claims (Seaton, 1982).

DESCRIPTION

The claims form a sinuous strip mostly less than 2 km wide, which trends generally north-north-easterly along the Aphebian-Helikian unconformity. From the northern end of the KAY claims to the southern end of the PAN claims is roughly 18 km.

The Aphebian basement is mainly composed of felsic ignimbrites of the Sloan Group (Hoffman, 1978). Minor silicic and locally pyritic volcanoclastic mudstones also outcrop at the common boundary of the KAY and PAN groups.

The Helikian sediments belong to the Fault River fluvial system of the lower Hornby Bay Group (Kerans and others, 1981), and include basal polymictic conglomerate, arkosic to quartzitic arenites and quartz pebble conglomerate.

CURRENT WORK AND RESULTS

Geological mapping, at more detailed scales than in 1977, explored both claim groups; the KAY claims were mapped at 1:31,690 and the PAN claims at 1:7,920. Concurrent radiometric prospecting did not find any significant uranium mineralization. The KAY and PAN claims were covered by a helicopter-borne gamma ray spectrometer survey, flown on north-south lines at 100 m spacing. Follow-up of anomalies did not find uranium mineralization.

IP-resistivity surveying was used in an unsuccessful attempt to trace a pyritiferous zone in the basement rocks under Helikian cover. The basement rocks were noted to have an overall higher

chargeability than the cover rocks. This is unrelated to local sulphide enrichment.

Lake water and lake sediment sampling was continued. Sediments were analysed for uranium, copper, lead, zinc, nickel and arsenic, while waters were analysed for uranium.

KEN and TAS CLAIMS	Uranium
B.P. Minerals Limited,	86 K/14
Suite 1401 25 Adelaide St. E.,	$66^{\circ}45'$N, $117^{\circ}12'$W
Toronto, Ontario, M5C 1Y2	

REFERENCES

Baragar and Donaldson (1973); Hoffman (1978); Kerans and others (1981); Seaton (1982).

PROPERTY

KEN 1-75; TAS 1-135.

LOCATION

The claims are roughly 480 km north-northwest of Yellowknife at the head of the Bigtree and Fault River drainage systems (Fig. VI-3).

HISTORY

Regional geological, geophysical and geochemical surveys preceded staking of the KEN and TAS claims in late 1976 (Seaton, 1982).

During 1977 geological mapping was continued, and detailed soil sampling tested anomalies.

DESCRIPTION

The claims are underlain by volcanics of the Sloan Group (Hoffman, 1978), unconformably overlain by Hornby Bay Group sediments (Baragar and Donaldson, 1973; Kerans and others, 1980).

CURRENT WORK AND RESULTS

In 1978 the KEN and TAS claims were geologically mapped at 1:10,000. Soil samples were collected over a grid covering the KEN claims and the western half of the TAS claims. Samples were analysed for uranium, copper, cobalt, lead and nickel. Scintillometer readings and pH measurements were made at each sampling site.

Several one or two point uranium anomalies, most of which were accompanied by anomalous copper and lead concentrations are spatially related to the Helikian-Aphebian unconformity. A few anomalies are evidently related to structures in the Aphebian basement.

Several areas of anomalous radioactivity were delineated. The only uranium mineralization observed was in a cherty boulder. A northerly trending zone of anomalous radioactivity in the north of the TAS claims crosscuts volcanic stratigraphy and the Aphebian-Helikian unconformity.

BSD, ERK, GJC, JO, MAG	Uranium
and SUN CLAIMS,	86 K/14,15; 86 N/1,2
B.P. Mineral Limited,	$66^{\circ}58'$ - $67^{\circ}07'$N,
Suite 1401 25 Adelaide St. E.	$116^{\circ}15'$ - $117^{\circ}05'$W
Toronto, Ontario, M5C 1Y2	

REFERENCES

Baragar and Donaldson (1973); Gibbins and others (1977); Hoffman (1978); Kerans and others (1981); Seaton (1982); Seaton and Hurdle (1978).

PROPERTY

BSD 43-82; ERK 1-177; 396 GJC claims; JO 1-42; MAG 1-102; SUN 1-25.

LOCATION

The properties are roughly 530 km north-northwesterly of Yellowknife (Figs. VI-3 and VI-4). They extend from a point 3 km south-southwest of the confluence of the Coppermine and Kendall Rivers for 25 km in a west-southwesterly direction.

HISTORY

Prospecting Permits 310 and 311 covering 86 N/2 and 3 respectively were granted to B.P. Minerals in 1973. During 1974, 1975 and 1976, geological mapping, airborne radiometric prospecting, stream sediment and soil sampling explored the permit areas and adjoining ground and particularly the Aphebian-Helikian unconformity (Gibbins and others, 1977; Seaton and Hurdle, 1978). Seventy-four MAG claims were covered by an airborne EM, magnetometer and radiometric survey. Staking along the unconformity followed the regional surveys. Among the claims staked were the BSD, ERK, GJC, JO, MAG and SUN.

Most of the claims were recorded in early January, 1977. The MAG claims were recorded in April, 1977 and an additional 130 GJC claims were recorded in September, 1977.

DESCRIPTION

The properties straddle the Aphebian-Helikian unconformity at the northern extremity of the Great Bear volcano-plutonic complex. From east to west the surface trace of the unconformity follows a sinuous, generally westerly course successively through the SUN, ERK, BSD, JO and GJC claims. At the western end of the GJC claim block the unconformity swings to a south-southwesterly direction through the MAG claims.

Geological mapping at 1:250,000 (Baragar and Donaldson, 1973) north of latitude 67°N on NTS 86 N does not fit in detail with 1:125,000 mapping directly to the south on 86 K (Hoffman, 1978). Assuming greater accuracy for the more detailed scale map, it would appear that the Aphebian basement is composed mainly of adamellite, granodiorite and plagioclase-hornblende porphyry (Harrison porphyry) which are in fault contact with granite of the Spence Pluton which outcrops directly southeast of the Bigtree Fault. Near the Coppermine River Hoffman (1978) has mapped mudstones of the Dumas Group and Harrison porphyry, whereas Baragar and Donaldson (1973) have mapped only porphyritic felsite directly to the north. Some of the differences probably stem from different scales of mapping and the grouping of various finer grained porphyritic plutonic rocks as porphyritic felsite, unit 7 of Baragar and Donaldson (1973).

Helikian Hornby Bay Group rocks (Kerans and others, 1981) unconformably overlie the Aphebian basement.

CURRENT WORK AND RESULTS

In 1978 1:10,000 geological mapping and grid soil sampling explored all the claim blocks. The samples were analysed for uranium, copper, lead, cobalt and nickel. Scintillometer readings and pH measurements were made at each sample site. Track etch surveys of the ERK, GJC, JO and BSD claims were completed.

An airborne VLF-EM, magnetometer and radiometric survey of the Kendall River area covered

the claims (excluding the southern part of the MAG claims) and an area of roughly 1,500 square km, mainly to their north and northwest.

Anomalous radioactivity was found at several locations. One of these is on the eastern ERK claims, another on the JO claims. A radioactive granite boulder with secondary uranium minerals was found on the GJC claims.

Numerous uranium anomalies were delineated by soil sampling, some coincide with anomalies for one or more of the other metals analysed.

Several track etch anomalies were outlined. On the ERK claims, a track etch anomaly coincides with anomalous uranium and copper in soils; another anomaly at the boundary between the BSD and JO claim blocks is coincident with soils anomalously high in uranium.

LAC CLAIMS — Uranium
Hudson's Bay Oil and Gas — 86 K/15
700-2nd Street, S.W., — $66^{o}56'N$, $116^{o}59'W$
Calgary, Alberta,
T2P 2W1

REFERENCES

Hoffman (1978); Kerans and others (1981); Seaton (1982).

PROPERTY

LAC 1-25

LOCATION

The claims are roughly 515 km north-northwesterly of Yellowknife and 100 km north-northeasterly of Port Radium (Fig. VI-3).

HISTORY

The claims were staked in April, 1977.

During 1977 the claims were geologically mapped at 1:31,680, concurrently with radiometric prospecting. Radioactivity found in slumped blocks and boulders of Hornby Bay Group basal conglomerate was traced to thorium in the matrix.

Airborne radiometrics in 1977 explored selected structural features, but did not detect any anomalies. An AEM (Input) survey also covered the claims together with the nearby KAY and PAN claims (this report). The claims were were explored by a regional program of lake water and lake sediment sampling (Seaton, 1982).

DESCRIPTION

The claims cover a 500 m by 100 m outlier of lower Hornby Bay Group conglomerate, arkose and subarkose which is bounded on its northeast side by a northwest striking fault. The fluvial sediments of the Hornby Bay Group (Kerans and others, 1981) lie unconformably on granitoid rock of the Great Bear volcano-plutonic complex (Hoffman, 1978) which is locally capped by regolith. Apart from the small Helikian outlier only granitoid rocks outcrop on the claims.

CURRENT WORK AND RESULTS

In 1978 the claims were geologically mapped at 1:7,920, and areas of interest noted in 1977 were prospected in greater detail.

A Radiometric survey flown on north trending lines at 100 m spacing detected one anomaly.

Lake sediment and lake water sampling was continued in 1978. Sediment samples were analysed for uranium, copper, lead, zinc, nickel and arsenic; lake waters were analysed for uranium only. Anomalous metal contents were not detected.

TEE CLAIMS — Uranium
Hudson's Bay Oil and Gas — 86 K/15
Company Limited, — $66^{o}52'N$, $116^{o}58'W$
700-2nd Street, S.W.,
Calgary, Alberta,
T2P 2W1.

REFERENCES

Hoffman (1978); Kerans and others (1981); Seaton (1982).

PROPERTY

TEE 1-20.

LOCATION

The claims are roughly 505 km north-northwest of Yellowknife and 90 km north-northeast of Port Radium (Fig. VI-3).

HISTORY

The TEE claims were staked in April, 1977.

During 1977 the claims were geologically mapped at 1:31,680 and radiometrically prospected. Selected structural features were tested by helicopter borne radiometric surveys.

Lake water and a lake sediment sample were collected at one site on the claims during a regional survey (Seaton, 1982).

DESCRIPTION

The property straddles the northeasterly striking Fault River Fault and a sub-parallel fault 400 to 500 m to the northwest. The claims cover part of an outlier of basal Hornby Bay Group conglomerate and subarkosic arenite of the Fault River Fluvial System (Kerans and others, 1981).

Granitoid rocks of the Great Bear volcano-plutonic complex and associated felsic volcanics of the Sloan Group (Hoffman, 1978) underlie most of the claims. Roughly 25% of the property is covered by the waters of Bigtree Lake.

CURRENT WORK AND RESULTS

The claims were geologically mapped at 1:7,920.

An airborne spectrometer survey with 100 m spacing between north-south lines explored the claims.

Lake water and lake sediment samples were collected at four sites within the claims. One of the sediment samples was found to have a highly anomalous zinc content and background uranium, copper, lead, nickel and arsenic values. Water samples were analysed for uranium, but none were anomalous.

A small radioactive occurrence was noted in green dacitic rock near a small diabase dike.

COP CLAIMS — Uranium
Hudson's Bay Oil and Gas — 86 K/16, 86 N/1
Company Limited, — $66^{o}59'N$, $116^{o}14'W$
700-2nd Street, S.W.,
Calgary, Alberta,
T2P 2W1

REFERENCES

Baragar and Donaldson (1973); Craig (1960); Hoffman (1978); Hornbrook and others (1976b); Kerans and others (1981); Seaton (1982).

PROPERTY

COP 1-81.

LOCATION

The centre of the property is roughly 510 km north-northwesterly of Yellowknife and 180 km northeasterly of Port Radium (Fig. VI-3). The claims are roughly 1 km southeast of the Coppermine River.

HISTORY

Geological Survey of Canada regional geochemical surveys (Durham, 1977; Hornbrook and others, 1976b) explored the area.

The claims were staked in 1977. Geological mapping and prospecting and airborne radiometrics explored the claims during the same year (Seaton, 1982).

DESCRIPTION

The claims are underlain by basal and intraformational conglomerate and arkosic sediments of the Hornby Bay Group (Baragar and Donaldson, 1973; Kerans and others, 1981) which unconformably overlie Aphebian rocks of the McTavish Supergroup (Hoffman, 1978). Glacial deposits (Craig, 1960) reach thicknesses of over 54 m below the escarpment bordering the Coppermine River just west of the claim area.

CURRENT WORK AND RESULTS

Geological mapping was continued and an airborne radiometric survey with northeasterly flight lines at 100 m intervals detected several weak anomalies.

An IP survey showed uniformly low chargeabilities and high resistivities.

PROSPECTING PERMIT 450-454,	Uranium
BM, JOHN and RON CLAIMS	86 L/9,10,11,14,15,16
Gulf Minerals Canada Ltd.,	86 M/1,2,7,8,
Suite 1400, 110 Yonge St.,	86 N/4,5
Toronto, Ontario,	66°37' - 67°30'N
M5C 1T4	117°54' - 119°07'W

REFERENCES

Baragar and Donaldson (1973); Craig (1960); Kerans and others (1981); Seaton (1982).

PROPERTY

Prospecting Permits 450, 451, 452, 453, 454, BM 1-9; JOHN 1-126; RON 6-21.

LOCATION

Gulf Minerals base camp at Dease Lake on 86 M/1 was roughly 560 km north-northwesterly of Yellowknife, 28 km east of Greenhorn Lakes, and 40 km northeasterly of Dease Arm, Great Bear Lake. The properties extend as far as 39 km north, 51 km south, 15 km east and 26 km west of Dease Lake (Fig. VI-3).

HISTORY

Prospecting Permits 450-454 were acquired on April 1, 1977.

During 1977 the permits and some adjoining ground were explored by geological mapping, lake sediment and lake water sampling, a combined airborne radiometric, magnetometer and VLF-EM survey, and by scintillometer prospecting. Radioactive zones and uranium mineralization were discovered on Prospecting Permit 450 (86 L/15) and on the JOHN claims (86 L/10, 11, 14). Malachite showings were noted on Prospecting Permit 454 (86 M/8). The JOHN claims were recorded in September, 1977 (Seaton, 1982).

DESCRIPTION

Reconnaissance mapping (Kerans and others, 1981) and local detailed stratigraphic studies indicate that only the area on 86 L/15 south of the east-northeasterly trending East River Fault Zone is underlain by rocks of the Hornby Bay Group. The remainder of the area (including 86 M/2), except for the BM claims, is underlain by Dismal Lakes Group rocks, ranging from units 11 to 16. Massive and laminated dolomite units 14 to 16 cover most of the 86 M/2, all of 86 M/7 and about half of 86 M/8. Within the exploration area unit 16, a laminated dolomite overlying the massive dolomite of unit 15, is found only on 86 M/7.

Interpretation of the geology by Gulf Minerals geologists is significantly different from that of Kerans, Ross and Donaldson. The most obvious differences are in the correlation of the clastic units. These were studied mainly by Ross, whereas Kerans concentrated on the dolomitic units.

In weighing the more detailed property mapping by Gulf Minerals against the regional study of the clastic units by Ross, account must be taken of facies changes across the Leith Line, a probable depositional hinge which strikes north through the BM claims along the eastern margin of the exploration area (Kerans and others, 1981). Correlation of units across the Leith Line would require familiarity with the regional relationship of the various facies of fluvial and marine sediments of the Hornby Bay and Dismal Lakes Group.

Our present understanding of the geology of the western Amundsen Basin is obviously far from complete.

CURRENT WORK AND RESULTS

Geological mapping was continued on the permits, the JOHN claims and on the BM claims on 86 N/4 north and south of Lac Le Roux. The BM claims were staked in March, 1978.

Geochemical and geophysical surveys explored parts of the claims and permits.

Soil sampling explored the Bear Mountain area (which includes the BM claims), Area A (over part of which the RON claims were staked in September, 1978), Area B and the Wiggin Lake area. Samples were split, one half being sent to Calgary for uranium and arsenic analysis and the other half to Barringers' Toronto laboratory for 24 element laser trace method analysis. Numerous uranium anomalies, many several times background, were outlined. In general the strongest and most abundant uranium anomalies were in the Bear Mountain area, where uraniferous boulders and uranium showings in bedrock are found. Several uranium anomalies and a single uranium-arsenic anomaly were also outlined in Area A.

Helium and hydrocarbon gases in soil samples, lake sediment samples and lake water were analysed and a Track Etch Survey performed on the Area 1 grid.

Ground radiometric, VLF-EM and IP-resistivity surveys explored the Areas 1 and 2 grids. Anomalous

radioactivity coincided roughly with boulder and outcrop mineralization found on the Area 1 grid. The mineralization is stratabound and is of limited outcrop extent.

The Area 2 grid covers a low grade uraniferous boulder train. It has no corresponding ground radiometric signature.

Northerly glacial transport is indicated by alignment of drumlins and other glacial features (Craig, 1960).

PROSPECTING PERMIT 512	Uranium
Hudson's Bay Oil and Gas Company Limited,	86 L/10 SW
700-2nd Street, SW,	66°30' - 66°37'30"N
Calgary, Alberta,	118°45' - 119°00'W
T2P 2W1	

REFERENCES

Craig and others (1960); Hornbrook and others (1976); Kerans and others (1981); Seaton and Hurdle (1978).

PROPERTY

Prospecting Permit 512.

LOCATION

The prospecting permit is 495 km northwesterly of Yellowknife. It is on the Dease Peninsula 20 km west of Hornby Bay, Great Bear Lake (Fig. VI-3).

HISTORY

Prospecting Permit 512 was granted to Hudson's Bay Oil and Gas Company on January 1, 1978.

DESCRIPTION

The published geological map of the area (Craig and others, 1960) is at reconnaissance scale of 1:506,880 (1 inch = 8 miles). More recent mapping (Kerans and others 1981) shows the area adjacent to the southeast corner of the property to be underlain by dolomite (unit 9 of the Hornby Bay Group). Clastic sediments grouped with the Lady Nye fluvial system (unit 8c) are exposed roughly 20 km to the north of the permit area. The intervening ground is unmapped. Esso Resources Canada Limited hold the H65-72 claims. These claims were staked to cover a lake sediment anomaly (Hornbrook and others, 1975); they adjoin Prospecting Permit 512 to the north. Geological mapping of the claims in 1977 during the Hornby-Dease Project (Seaton and Hurdle, 1978) indicated that sandstones underlying the H65-72 claims probably belong to unit 11 of the Dismal Lakes Group.

The regional geology in this area is only partly mapped and not well understood. It would appear that distribution of Hornby Bay Group and Dismal Lakes Group sedimentary units and facies is the product of gentle dips, variable strikes, variable topographic relief and especially faulting; some faulting was probably syndepositional. Reconstruction of pre-faulting relationships is complicated by a history of intermittent reactivation of faults, with changed strike slip and dip slip components. The east-northeasterly striking East River Fault Zone and the northerly trending Leith (hinge) Line (Kerans and others, 1981), roughly 40 km north and east of the property, are important regional structural features which undoubtedly affect the distribution and lateral variation of the Hornby Bay Group.

CURRENT WORK AND RESULTS

Work consisted of 1:63,360 geological mapping, prospecting, airborne radiometrics and lake sediment sampling. Reconnaissance IP and resistivity surveying explored part of the southern half of the property which was covered by the airborne survey, including an area of roughly 500 m radius in which airborne radiometrics detected three anomalies.

Follow-up of the airborne radiometric survey included a more detailed survey of one anomaly, flown at 50 m nominal altitude and 50 m line spacing. Soil sampling showed anomalous concentrations of uranium, copper, and arsenic in bog soils associated with one radiometric anomaly, and in the southwestern part of the permit.

Exposure is sparse. Most of the outcrop mapped is othoquartzite.

MV CLAIMS	Uranium
Uranerz Exploration and Mining Limited,	86 N/1, 86 O/4
P.O. Box 137	67°04'N, 116°03'W
La Ronge, Saskatchewan	
S0J 1L0	

REFERENCES

Baragar and Donaldson (1973); Craig (1960); Kerans and others (1981).

PROPERTY

MV 1-310.

LOCATION

The claims are roughly 520 km north-northwesterly of Yellowknife, just east of the Coppermine River (Fig. VI-4).

HISTORY

The claims were recorded in january, 1977.

Exploration initiated in 1977 included geological mapping, lake water and lake sediment sampling, prospecting and a scintillometer survey of a grid.

Work was undertaken by Uranerz as operator in a joint venture with SMD Mining Company Limited and Home Oil Company Limited.

DESCRIPTION

Mapping in 1969 (Baragar and Donaldson, 1973) shows all of the area staked, except for small areas on the western and southern margins, to be underlain by glacial drift. The western margin is shown as underlain by Aphebian granite and the southern margin by sandstones with minor conglomerate of unit 8 of the Hornby Bay Group. No outcrop is indicated within the area, the bedrock geology presumably being inferred from outcrops 3-6 km away. Units 13 to 16 were mapped as outcropping on the west bank of the Coppermine River, just north of its confluence with the Kendall River, from 3 to 13 km northwest of the claims. East of the claims Baragar and Donaldson's map shows units 12 to 16 as outcropping between the Muskox Intrusion and the Coppermine River.

Later mapping (Kerans and others, 1981) shows units 11, 12 and 13 of the Dismal Lakes Group as striking west-northwesterly through the MV claims. Unit 8a of the Hornby Bay Group is shown as underlying the southwestern part of those claims. Unit 8a denotes

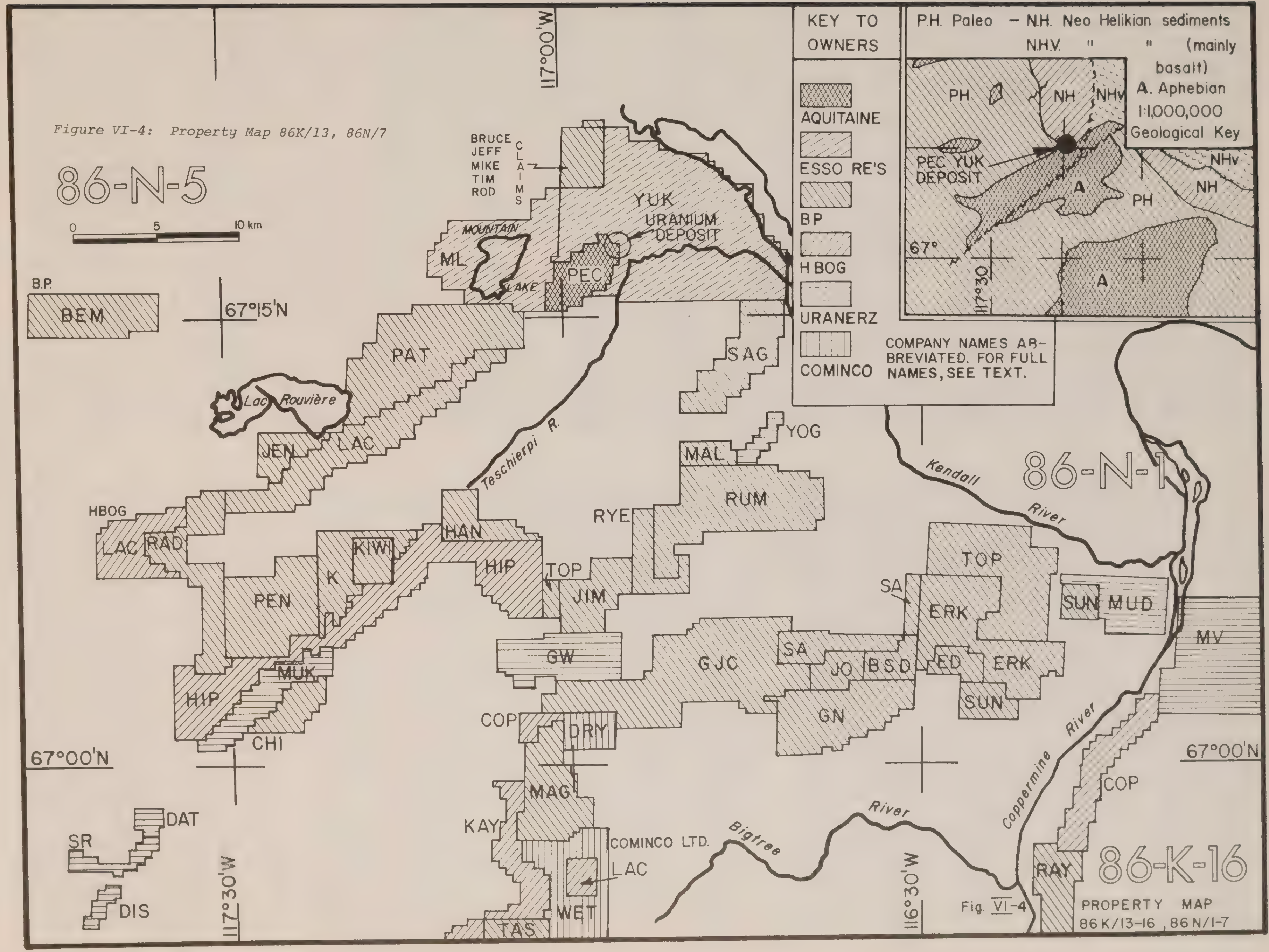


Figure VI-4: Property Map 86K/13, 86N/7

rocks of the Bigbear Fluvial System. Bigbear Creek flows northwest to the Coppermine River through the southwestern part of the MV claims.

Glacial transport was northwesterly through the claim area (Craig, 1960).

CURRENT WORK AND RESULTS

During 1978 a 1:15,480 geological map of the claims and a roughly equivalent area to the west and south was completed. The mapping differs substantially from that published by Baragar and Donaldson or the later revision mainly by Ross (Kerans and others, 1981). For example, a 1-2 km wide belt of porphyritic felsite or rhyolite has been mapped east of the granite in the eastern part of the property. Dolostones interbedded with red and green shales and mudstones apparently belong to unit 13 of the Dismal Lakes Group and overly sandstones, quartzites and microconglomerates of the lower Dismal Lakes Group; presumably of units 11 and 12, though no intercalated black shales indicative of unit 12 are reported. Fanglomerate, arkose and red sandstone of unit 8 a of the Hornby Bay Group underlie the Dismal Lakes Group. The red sandstone and arkose are shown to overlie the Aphebian basement. In view of the abundant drift cover mapped by Baragar and Donaldson, it would seem difficult to determine the local stratigraphy with certainty.

An airborne radiometric survey detected several anomalies on the claims and lake water and lake sediment sampling was completed.

A grid 2,000 m wide extending 5,600 m northeast across the central part of the property was explored by EM, an IP and resistivity survey and a magnetometer survey. The IP and resistivity survey and a Track Etch radon survey tested targets outlined by lake sediment sampling and EM surveys within the grid area. Geophysical and Track Etch results were generally inconclusive. A prominent magnetic high trends north-northeasterly across the southeastern half of the grid. This is probably a diabase dyke buried beneath glacial deposits.

JIM, RUM, RYE and TOP CLAIMS — Uranium
BP Minerals Limited, — 86 N/2,3
Suite 1401 25 Adelaide St. E., — $67^{\circ}04'$ - $67^{\circ}10'$N
Toronto, Ontario, — $116^{\circ}37'$ - $117^{\circ}02'$W
M5C 1Y2

REFERENCES

Baragar and Donaldson (1973); Hoffman (1978); Kerans and others (1981); Seaton (1982); Seaton and Hurdle (1978).

PROPERTY

JIM 1-72; 248 RUM claims; RYE 1-57; TOP 1-15.

LOCATION

The centre of the claim block is roughly 530 km north-northwesterly of Yellowknife and 60 km north-easterly of Hornby Bay, Great Bear Lake (Fig. VI-4).

HISTORY

BP Minerals explored the 86 N/2, 3, 4 claim sheets as Prospecting Permits 310, 311 and 312 (Seaton and Hurdle, 1978). The MAL claims, which adjoin the claim block to the north, were staked and explored in 1977 (Seaton, 1982).

RUM 1-178 and JIM 1072 were recorded in early 1977, to cover uranium anomalies outlined by soil sampling. The property was explored by 1:63,360 geological mapping and geochemical follow-up tested anomalies on the JIM claims. An additional 70 RUM claims, the RYE and TOP claims were recorded in September, 1977.

DESCRIPTION

The claims are underlain by Aphebian felsic ash flow tuffs and granite, unconformably overlain by Helikian Hornby Bay Group sandstones and conglomerates (Baragar and Donaldson, 1973) of the Lady Nye Fluvial System (Kerans and others, 1981). The claims cover the trace of the unconformity which follows a sinuous but generally northeasterly course, along the southeastern margin of a large inlier of Aphebian rocks. Similar rocks reappear from beneath the Helikian sedimentary cover to form the main exposed body of the Great Bear volcano-plutonic complex 10-20 km to the south (Hoffman, 1978).

CURRENT WORK AND RESULTS

Geological mapping at 1:10,000 explored the property and some adjoining ground.

Soil samples were collected at 300 m spacing from the JIM claims and at 150 m intervals, on lines spaced 300 m apart, from the RUM and much of the RYE claims. Soil samples were analysed for uranium, copper, lead, nickel and in some cases cobalt. Scintillometer readings were taken and pH measured at soil sampling sites.

A airborne radiometric, magnetometer and VLF-EM survey, the Kendall River Project, covered an area including the claims; it is described in a separate section of the report.

A track etch radon survey of the JIM claims outlined an anomaly on the trace of a fault. The anomaly is coincident with a zone of anomalously high uranium content in soils.

HAN, K, KIWI and PEN CLAIMS — Uranium
B.P. Minerals Limited, — 86 N/3
Suite 1401 25 Adelaide St. E., — $67^{\circ}04'$ - $67^{\circ}09'$N
Toronto, Ontario, — $117^{\circ}03'$ - $117^{\circ}30'$W
M5C 1Y2

REFERENCES

Baragar and Donaldson (1973); Craig (1960); Gibbins and others (1977); Hoffman (1978); Kerans and others (1981); Seaton (1982); Seaton and Hurdle (1978).

PROPERTY

HAN 1-54; K 1-70; KIWI 1-30; PEN 1-149.

LOCATION

The claims are roughly 540 km north-north-westerly of Yellowknife and extend northeasterly for 22 km across the centre of 86 N/3 (Figs. VI-3 and VI-4). The K, KIWI and PEN claims form a single block. The HAN claims are 1.5 km to the northeast.

HISTORY

In 1973 B.P. Minerals acquired 86 N/3 as Prospecting Permit 311, and explored the area prior to staking the HAN, K, KIWI and PEN claims (Gibbins and others, 1977; Seaton and Hurdle, 1978). On March 31, 1977 Prospecting Permit 311 expired.

In 1976 a spectrometer survey explored a 300 m by 150 m grid covering anomalously radioactive outcrops

in the south-central part of the KIWI claims. The KIWI calims were recorded in September, 1976 and the HAN claims in December, 1976.

During 1976 soil sampling explored the KIWI claims and the area staked in April, 1977 as the PEN claims. The PEN claims cover lake sediments of anomalous uranium content. Samples from the KIWI claims were analysed for uranium, copper, lead, nickel, cobalt and molybdenum. Those from the PEN claims were analysed for uranium, copper, lead and cobalt.

During 1977 the HAN claims were geologically mapped at 1:12,000 and explored by soil sampling which delineated uranium-copper anomalies. The anomalies were mostly from soils rich in clay and organic material, though some of the anomalies appear spatially related to faults.

DESCRIPTION

The claim groups cover part of an inlier of rocks presumed to be part of the Aphebian Great Bear volcano-plutonic complex which is exposed less than 20 km to the south (Baragar and Donaldson, 1973; Hoffman, 1978). Felsic ash flow tuffs which underly much of the HAN claim block are probably correlative with the Sloan Group of the McTavish volcanics (Hoffman, 1978). The PEN, K and KIWI claims are largely underlain by granitoid rocks.

All the claim blocks except the KIWI property are in part underlain by sediments of the Lady Nye Fluvial System (Kerans and others, 1980) of the Hornby Bay Group. Hornby Bay Group sediments exposed on the K claims just northeast of the KIWI group are in fault contact with Aphebian granitoid rocks which outcrop on the northwest side of the Teschierpi Fault. On the other claim groups the Hornby Bay Group-Aphebian boundary is an unconformity. Basal Hornby Bay Group boulder conglomerate overlies the unconformity and underlies sandstones on the HAN claims. Regolith locally caps the Aphebian basement rocks.

The northeasterly striking Teschierpi Fault, a strike slip fault affected by later dip slip movements, cuts the Aphebian inlier on which the claims are staked. The PEN claims lie mostly northwest of the Teschierpi Fault, the K and KIWI claims straddle the fault and the HAN claims are largely on its southwest side.

The surficial geology was described by Craig (1960).

CURRENT WORK AND RESULTS

The claim blocks were covered by an airborne magnetometer, VLF-EM and radiometric survey (Kendall River project).

Geological mapping at 1:10,000 covered the KIWI claims. Geological mapping at 1:12,000 explored the PEN claims and was completed on the HAN claims. Uranium showings were not found on any of the claims but malachite staining on regolith was noted on the PEN claims.

Soil sampling explored the KIWI and PEN claims. Analyses were made for uranium, copper, lead and nickel. Soil pH and scintillometer measurements were made at sample sites on the PEN claims. Two zones of anomalous uranium were delineated on the PEN claims. Three uranium anomalies were found on the KIWI claims.

Rock chip samples were taken from the PEN and KIWI claims. Those from the PEN claims were analysed for uranium, copper, cobalt, nickel and manganese; those from the KIWI claims were analysed for thorium, molybdenum and silver in addition to the above elements. Scintillometer counts were made at rock chip sampling sites on the PEN claims.

HIP CLAIMS	Uranium
Hudson's Bay Oil and Gas Company Limited,	86 N/3, 4
700-2nd Street, Calgary, Alberta, T2P 0X5	67°04'N, 117°20'W

REFERENCES

Baragar and Donaldson (1973); Craig (1960); Durham (1977) Gibbins and others (1977); Hoffman (1978); Kerans and others (1981). Seaton (1978, 1982).

PROPERTY

HIP 1-307.

LOCATION

The claims are roughly 540 km north-north-westerly of Yellowknife and 60 km west of the confluence of the Kendall and Coppermine Rivers (Figs VI-3 and VI-4).

HISTORY

The HIP claims were recorded in May, 1977 on ground previously explored by BP minerals Limited (Gibbins and others, 1977; Seaton, 1978).

Exploration in 1977 included geological mapping, airborne geophysics, regional lake water and lake sediment sampling and prospecting (Seaton, 1982).

DESCRIPTION

The claims cover part of the southeastern margin of a 50 km by 20 km northeasterly trending inlier of Aphebian granitoid rocks and volcanics. The Aphebian rocks are similar in lithology to some of those of the Great Bear volcano-plutonic complex. The inlier is probably connected beneath the intervening Helikian Hornby Bay Group sediments with the main body of the Great Bear volcano- plutonic complex 10 km to the south. The northeasterly striking Teschierpi Fault roughly bisects the inlier of Aphebian rocks. Volcanics of the McTavish Volcanics Supergroup (Hoffman, 1978) are more abundant in that part of the inlier southeast of the fault whereas granitoid rocks predominate on the northwest side. The volcanics mapped in 1969 as porphyritic felsite are mainly ignimbrites, probably belonging to the Sloan Group of the McTavish Volcanics.

The Hornby Bay Group sediments, unconformably overlying the Aphebian basement, include quartz arenite, subarkosic arenite, conglomerate and conglomeratic sandstone.

Thick glacial and glacio-fluvial deposits (Craig, 1960) obscure part of the Aphebian-Helikian unconformity. The glacial deposits are particularly abundant over Helikian sediments. Aphebian quartz-monzonite and granodiorite outcrop southeast of the Teschierpi Fault in the western part of the property, according to 1;31,680 mapping by Hudson's Bay Oil and Gas Company geologists. However a less detailed scale regional interpretation (Kerans and others, 1981) shows only Hornby Bay Group sediments of the Lady Nye Fluvial System in this area.

CURRENT WORK AND RESULTS

Geological mapping in more detail than the 1977 reconnaissance was completed over the claims. Boulder and bedrock radiometric prospecting and the monitoring of background radiation was done concurrently with geological and geochemical surveys and with checks on radiometric anomalies identified by airborne surveys.

An airborne radiometric survey covered the property on lines at 100 m spacing. The 27 anomalies found on the HIP claims were rated poor, and those checked were mostly attributed to granite boulders.

An IP-resistivity survey tested the Aphebian-Helikian unconformity near the Western boundary of the property. A chargeability contrast between Aphebian basement rocks and Helikian sediments was observed, but no significant anomalies recorded.

A regional lake water and lake sediment survey was continued, to produce a sampling density of one sample per 1.4 square km. Twenty-eight lake sediment samples were collected in 1978 from the HIP claims and analysed for uranium, copper, lead, zinc, nickel and arsenic. Lake water samples collected from the same sites were analysed for uranium only. High arsenic contents of two lake sediment samples from the western part of the claims were unexplained.

JEN, LAC, PAT and RAD CLAIMS	Uranium
BP Minerals Limited,	86 N/3,4,6
Suite 1401, 25 Adelaide St. E.,	67°03' - 67°17'N
Toronto, Ontario,	117°04' - 117°34'W
M5C 1Y2	

REFERENCES

Baragar and Donaldson (1973); Craig (1960); Durham (1977); Gibbins and others (1977); Hoffman (1977); Kerans and others (1981); Seaton (1982); Seaton and Hurdle (1978);

PROPERTY

JEN 1-39; LAC 1-174; PAT 1-217; RAD 1-111.

LOCATION

The claims are roughly 540 km north-north-westerly of Yellowknife (Figs. VI-3 and VI-4). The LAC, JEN and PAT claims adjoin Lac Rouviere and the adjacent RAD claims extend 2-16 km south of the lake.

HISTORY

B.P. Minerals staked the LAC claims in late 1976. The RAD claims were recorded in January, 1977 and the JEN and PAT claims in April, 1977.

The exploration history has been described and referenced in the 1977 Mineral Industry Report (Seaton, 1982).

DESCRIPTION

The geology of the claims has been summarized by Seaton (1982).

The regional geology of 86N and 860 has been described by Baragar and Donaldson (1973), that of the Hornby Bay and Dismal Lakes Groups by Kerans and others (1981), and by Yeo (1979). The surficial geology has been described by Craig (1960).

The LAC claims cover a fault zone, which locally forms the northwestern boundary of a large inlier of Aphebian granitoid rocks and volcanics. The JEN claims adjoining and to the northwest of the LAC claims are covered by glacial outwash which is probably underlain by Helikian Hornby Bay Group sediments. The PAT claims adjoin and lie northwest of the LAC claims, and east of Lac Rouviere; they cover a satellite inlier of pre-Helikian rocks. These include granitoid rocks, presumably of the Great Bear volcano-plutonic complex, and according to B.P. Minerals geologists "pre-Great Bear Batholith" metasediments with a northwesterly trending foliation, that are preserved as a roof pendant in the granitoid pluton.

Supracrustal rocks on the southern side of the main inlier are similar to the felsic ignimbrites of the Sloan Group of the McTavish Volcanics (Hoffman, 1978). They were described as porphyritic felsite by Baragar and Donaldson (1973) and outcrop on the southeast side of the Teschierpi Fault. Distinctively foliated metasediments, evidently older than the granitoids and supracrustals of the adjoining Great Bear volcano-plutonic complex, have previously only been reported on the Leith Peninsula and in the Hottah Lake area (McGlynn, 1979), both south of Great Bear Lake.

The RAD claims lie on or near the Aphebian-Helikian unconformity marginal to the main inlier.

CURRENT WORK AND RESULTS

Geological mapping explored the PAT claims and was continued on the RAD claims.

Soil samples were collected from grids on the PAT and RAD claims. Samples were analysed for uranium, copper, lead, cobalt and nickel, and scintillometer readings were taken at each sampling site. Radon (alphameter) surveys explored parts of the PAT and RAD claims.

Two diamond drill holes tested targets on the PAT claims. One hole was drilled on the JEN and eight on the LAC claims. Drilling on the LAC claims indicated that in the claim area the Aphebian-Helikian contact is a fault.

Pyritic gossans with minor chalcopyrite and arsenopyrite are present at the contacts between the granitoid and supracrustal rocks of the PAT claims inlier. Minor pitchblende and secondary uranium minerals are found in narrow fractures cutting basement rocks near but not within the gossanous zones.

LAC II CLAIMS	Uranium
Hudson's Bay Oil and Gas Company Limited,	86 N/4
700-2nd Street,	67°08'N, 117°40'W
Calgary, Alberta	
T2P 0X5	

REFERENCES

Baragar and Donaldson (1973); Craig (1960); Durham (1973); Gibbins and others (1977); Hoffman (1978); Kerans and others (1981); McGlynn (1977); Seaton (1978, 1982).

PROPERTY

LAC 1-11. (LAC II used to distinguish these claims from a second group. The "II" is not part of the official name.)

LOCATION

The claims are roughly 540 km north-north-westerly of Yellowknife and roughly 50 km south of

Dismal Lakes (Fig. VI-3 and VI-4).

HISTORY

The LAC claims were recorded in December, 1977 on ground previously explored by a Geological Survey of Canada regional lake water and lake sediment survey (Durham, 1977) and by B.P. Minerals Limited (Gibbins and others, 1977; Seaton, 1978).

A reconnaissance airborne radiometric survey explored the claims in 1977.

DESCRIPTION

The LAC claims cover part of the unconformity between lower Hornby Bay Group paleo-Helikian rocks and a basement of Aphebian plutonics part of an inlier of granitoids and volcanics. The inlier is almost certainly part of the Great Bear volcano-plutonic complex (Hoffman, 1978), the main body of which is exposed a few kilometers to the south. The LAC II claims cover the western extremity of the inlier.

CURRENT WORK AND RESULTS

Geological mapping at 1:15,840 explored the claims. Boulder and bedrock prospecting and monitoring of background radiation were done concurrently with geological mapping.

An airborne radiometric survey with 100 m flight line spacing detected several anomalies, two of which were related to minor uranium showings.

A reconnaissance IP-resistivity survey over the inferred trace of the Aphebian-Helikian unconformity did not outline any significant anomalies.

BEM CLAIMS	Uranium
B.P. Minerals Limited,	86 N/4, 5
Suite 1401, 25 Adelaide St. E.,	$67^{\circ}15'N$, $117^{\circ}40'W$
Toronto, Ontario,	
M5C 1Y2	

REFERENCES

Baragar and Donaldson (1973); Kerans and others (1981); Seaton (1982).

PROPERTY

BEM 1-104.

LOCATION

The claims are roughly 530 km north-northwesterly of Yellowknife (Figs. VI-3 and VI-4).

HISTORY

The area was explored from 1973 to 1976 as part of B.P. Minerals' Prospecting Permit 312 and in the course of regional reconnaissance.

The BEM claims were staked in late 1976 to cover an anomaly outlined by soil sampling (Seaton, 1982). The claims were explored in 1977 by geological mapping and soil sampling.

DESCRIPTION

The claims cover Helikian sediments of the Hornby Bay Group, and underlying granitoid rocks which are presumably part of the Great Bear volcano-plutonic complex. The granitoid rocks form part of an Aphebian inlier. The inlier and surrounding rocks are cut by northerly trending faults. The inlier is roughly 15 km east of the Leith Line, considered a depositional hinge by Kerans and others (1981).

CURRENT WORK AND RESULTS

A 1:10,000 geological map of the claims was completed.

Soil sampling was continued. Whereas 1977 soil samples were analysed for uranium and copper only, those taken in 1978 were analysed for uranium, copper, nickel, lead and cobalt. Scintillometer readings were taken at sampling sites. Uranium and base metal anomalies were outlined. Some uranium anomalies in soils overlying basement rocks have an easterly trend, and are accompanied by anomalous copper, nickel, lead and cobalt contents. These anomalies are not obviously related to structural features. Other uranium anomalies are evidently related to northerly striking fault zones which cut both the Aphebian basement and the unconformably overlying Helikian sediments; these uranium anomalies are accompanied by anomalous copper only.

MAL and SAN CLAIMS	Uranium
PROSPECTING PERMITS 513, 514	86 N/5, 6
Hudson's Bay Oil and Gas	$67^{\circ}22'$ - $67^{\circ}30'N$
Company Limited,	$117^{\circ}00'$ - $117^{\circ}58'W$
700-2nd Street S.W.,	
Calgary, Alberta,	
T2P 2W1.	

REFERENCES

Baragar and Donaldson (1973); Craig (1960); Durham (1977); Gibbins and others (1977); Hoffman (1978); Kerans and others (1981); Seaton (1982).

PROPERTY

MAL 1-8; SAN 1-255. Prospecting Permits 513 and 514.

LOCATION

The properties are roughly 570 km north-northwesterly of Yellowknife (Fig. VI-3). Dismal Lakes stretch northwesterly through the central part of Prospecting Permit 513 and underlie the northeast corner of Prospecting Permit 514. The MAL and SAN claim block lies 5 km west of Prospecting Permit 514 and extends roughly 15 km west of Dismal Lakes.

HISTORY

Imperial Oil Limited explored 86 N/6 from 1974 till 1976 as Prospecting Permit 316 (Gibbins and others, 1977).

Hudson's Bay Oil and Gas Company staked the SAN claims in April, 1977 and explored them during the following summer, after which they staked the MAL claims in November and December, 1977 (Seaton, 1982). The claims of the MAL group are individually much larger than those of the SAN group, having been staked under the new Canada Mining Regulations.

Prospecting Permits 513 and 514 were granted to Hudson's Bay Oil and Gas on January 1, 1978.

DESCRIPTION

The MAL and SAN claim block and Prospecting Permit 514 cover the northern and eastern margins of an inlier of Aphebian granitoid and volcanic rocks, unconformably overlain by sediments of the Hornby Bay and Dismal Lakes Groups. The inlier is in part fault bounded. Hornby Bay Group sediments of units 8, 9, and 10 (Baragar and Donaldson, 1973) flank the Aphebian Inlier on its eastern and southern margins. Northwest of the northeasterly striking Falcon Lake fault, Hornby Bay Group rocks are missing and basal Dismal Lakes Group orthoquartzites of unit 11 flank the Aphebian

rocks; as on the MAL and SAN claim blocks. The Hornby Bay Group clastics flanking the inlier on Prospecting Permit 514 belong to the Lady Nye Fluvial System (Kerans and others, 1981) and are successively overlain to the northeast by carbonates of unit 9, siltstones and shales of unit 10, and units 11 to 16 of the Dismal Lakes Group.

Unit 11 sandstone of the Dismal Lakes Group is of economic importance in the Mountain Lakes area as a host for pitchblende. The sandstones of unit 12 are intercalated with black shale, unit 13 includes red mudstones and the remaining units of the Dismal Lakes Group are dolostones. Units 12 to 16 are exposed on Prospecting Permit 513 and unit 12 on that part of 514 which lies north of Dismal Lakes.

The Aphebian inlier is presumed to be part of the Great Bear volcano-plutonic complex. Several similar inliers are exposed south of the Dismal Lakes and north of the main body of the complex, which outcrops roughly 60 km to the southeast. Such inliers are not found west of the Leith Line, a presumed paleo-Helikian depositional hinge. The Leith Line which marks the western limit of exposure of Aphebian rocks of the Great Bear volcano-plutonic complex has been used to explain certain major facies changes in the paleo-Helikian Hornby Bay and Dismal Lakes Group sediments (Kerans and others, 1980). It trends north through the western end of the MAL and SAN group.

Both westerly and northerly to northwesterly directions of glacial transportation are found in the Dismal Lakes - Mountain Lake area (Craig, 1960). Radioactive boulders on 86 N/6 have probably been carried by northwestely moving ice from the Imperial Oil and Aquitaine Company of Canada deposits near Mountain Lake. A prominent esker extends from the western extremity of Dismal Lakes through the western part of the SAN and MAL claim.

CURRENT WORK AND RESULTS

Geological mapping at 1:31,680 explored Prospecting Permit 514, most of Prospecting Permit 513 and the MAL and SAN claims. Prospecting of outcrops, radioactive erratics and the monitoring of background radiation was done concurrently with mapping. Numerous uraniferous boulders were found on the permits and were presumed to have been glacially transported northwesterly from the Mountain Lake area.

Helicopter-borne radiometric surveys covered the MAL and SAN claim block and a smaller adjoining area to its south, as well as that part of Prospecting Permits 513 and 514 between the Aphebian inlier and the Dismal Lakes. Part of the Aphebian inlier was also surveyed. Except for a small area over the inlier, flight lines were northeasterly and southwesterly and at 100 m spacing. Mean altitude was roughly 20 m above ground level. Several anomalies were detected on the claims and permit areas. All of these were rated as poor.

The MAL claims were explored with horizontal loop EM. An IP and resistivity survey which covered parts of the MAL and SAN claims outlined an anomaly along the Aphebian-Helikian contact in the southwestern part of the claim block.

Lake water and lake sediments were sampled at 27 sites on the MAL and SAN claims and 34 sites on the Prospecting Permits. Lake water was analysed for uranium; lake sediments for uranium, copper, lead, zinc, nickel and arsenic. It was concluded that uranium-rich lake waters noted on the prospecting permits might be related to other nearby accumulations of uraniferous glacial erratics, or carbonate units in the area.

ML CLAIMS	Uranium
Esso Minerals Canada	86 N/6
(Division of Esso Resources Canada Limited),	67°16'N, 117°06'W
500-6th Avenue S.W.,	
Calgary, Alberta,	
T2P 0S1.	

REFERENCES

Baragar amd Donaldson (1973); Craig (1960); Kerans and others (1981); Seaton (1978, 1982).

PROPERTY

ML 1-215.

LOCATION

The property is centred about 550 km north-northwesterly of Yellowknife and includes Mountain Lake (Fig. VI-3 and VI-4). The claims adjoin the west side of the YUK claim block where Esso Minerals Canada have explored a uranium deposit.

HISTORY

In 1968 Aquitaine Company of Canada discovered uranium showings and staked them as the PEC group. In 1973 Imperial Oil Limited (of which Esso Resources Canada Limited is a wholly owned subsidary) staked YUK 1-66 adjoining and north of the PEC claims, to cover trains of radioactive sandstone erratics. In 1974 they acquired Prospecting Permit 316, adjoining and west of the PEC and YUK claims. Prospecting Permit 316 covered 86 N/6. The ML claims which adjoin and lie west of the YUK claim block (enlarged in 1975 and 1976) covers ground explored under Prospecting Permit 316 and were staked in September, 1976.

Exploration between 1974 and 1977, included tracing trains of glacial erratics, and a variety of surveys designed to locate their source. These surveys led to diamond drilling and delineation of a uranium deposit on the YUK claims continuous with that on the adjoining PEC group (Seaton, 1978, 1982). One hole was drilled in 1974 on the ML claims (then Prospecting Permit 316) 1.25 km west of the YUK and PEC claim blocks.

DESCRIPTION

The claims are underlain by sediments of units 9 and 10 of the Hornby Bay Group, overlain by unit 11 of the Dismal Lakes Group (Baragar and Donaldson, 1973; Kerans and others, 1981). The dolostone of unit 9 underlies only the southwestern margin of the property. Unit 10 is composed of red siltstone, varicoloured shale, and sandstone. Unit 11, host of the uranium mineralization on the PEC and YUK claims, and from which radioactive glacial erratics on the YUK and ML claims are derived, underlies the northern half of the ML claim block.

Outcrop is sparse except at the northern end of Mountain Lake. Glacial transport in the Mountain Lake-Dismal Lakes area was west-southwesterly to northwesterly. Trains of radioactive sandstone erratics have a west-southwesterly to west-north-westerly trend across the ML claims.

CURRENT WORK AND RESULTS

A 4.6 line km grid was surveyed across the ice

on Mountain Lake. Four diamond drill holes were completed from sites on this grid. One hole was abandoned and redrilled nearby. A total of 383 m was drilled, including 37 m in the abandoned hole.

Holes 78 ML-1 and -2 were drilled near the western shore of Mountain Lake 'up-ice' from a group of radioactive unit 11 sandstone and conglomerate boulders. Both holes intersected siltstone and sandstone of unit 10. The remaining holes were drilled near the centre and eastern shore of the lake through sandstone and silty sandstone of unit 11. With the exception of the abandoned hole, all penetrated unit 10. The contact between units 10 and 11 was found to be gradational; both in outcrop, on the western shore of Mountain Lake, and in the drill holes.

BRUCE, JEFF, MIKE, ROD
SAR and TIM CLAIMS
BP Minerals Limited,
Suite 1401 25 Adelaide St. E.,
Toronto, Ontario
M5C 1Y2

Uranium
86 N/7
$67^{\circ}20'$N, $116^{\circ}56'$W

REFERENCES

Baragar and Donaldson (1973); Craig (1960); Gibbins and others (1979); Kerans and others (1981); Seaton (1978, 1982); Seaton and Hurdle (1978).

PROPERTY

12 BRUCE claims; JEFF 1-34; 6 MIKE claims; ROD 1,2; SAR 1-24; 27 TIM claims.

LOCATION

The property is roughly 550 km north-north-westerly of Yellowknife (Figs. VI-3 and VI-4).

HISTORY

The BRUCE, JEFF MIKE and TIM claims were recorded August, 1974, the ROD claims in July, 1975 and the SAR claims in October, 1977.

Exploration of the property has been reported in several Mineral Industry Reports (Gibbins and others, 1977; Seaton, 1978, 1982; Seaton and Hurdle, 1978).

DESCRIPTION

The southwestern half of the property has locally abundant outcrops of unit 11 of the Dismal Lakes Group, which consists mainly of orthoquartzite with minor conglomerate. The conglomerate outcrops near the southwest corner of the property (at the western end of the TIM group and near the southwestern margin of the JEFF claims) and forms a narrow marker horizon within the orthoquartzite. The conglomerate marker is displaced several hundred metres to the southwest by a northwesterly trending fault, which has been traced from the southern margin of the property to its central part. To the north of the fault the conglomerate is probably obscurred by extensive surfical deposits. Southeast of the fault outcrop is sparse except near the southwestern margin of the property where unit 11 orthoquartzite, outcrops near a creek, which lies close to the trace of another northeasterly striking fault. To the north, where the creek crosses the boundary between the MIKE and SAR claims, unit 11 is conformably overlain by interbedded black shales and sandstones of unit 12 of the Dismal Lakes Group.

The regional dip is northeasterly. Local dips are gentle and strikes variable.

A regional study of the surficial geology (Craig, 1960) shows the direction of glacial transport as generally northwesterly across the area. This is in agreement with the direction indicated by the few drumlinoid ridges mapped in and near the claims by BP Minerals geologists.

Uranium mineralization and anomalous radioactivity is found along northeasterly striking faults, and in the northeastern part of the property (eastern TIM claims), aligned accumulations of radioactive boulders trend northwesterly from a uranium showing on the trace of a northeasterly striking fault.

Baragar and Donaldson (1973) mapped the regional geology (86N and 860). A recent sediment-ological study (Kerans and others, 1981) covers part of the same area.

CURRENT WORK AND RESULTS

During 1978 a 27.2 line_km grid covering most of the southern half of the property was explored by IP-resistivity survey. Two IP anomalies were detected; one in the southeastern part of the property (on the eastern TIM claims) and the other at the western end of the grid on the JEFF claims. Neither anolamy is fully outlined since both are on grid margins.

A linear resistivity low corresponds with the fault which has been traced northeastwards to the centre of the property.

Diamond drilling explored the two IP anomalies. One hole was drilled on the western anomaly (in the southwestern part of the JEFF claims) and one hole explored the anomaly on the eastern TIM claims. Eight diamond drill holes were drilled near the TIM claims anomaly and a uranium showing. These holes were intended to test the subsurface extent of the showing. Only one hole intersected uranium mineralization, which was at shallow depth and close to the surface showing. All holes encountered a polymictic conglomerate - presumably the conglomerate marker - within orthoquartzite and at shallow depth. A total of 1,039 m was drilled.

ALL NIGHT LAKE - MELVILLE
CREEK PROJECT
Uranerz Exploration and
Mining Limited
P.O. Box 137,
La Ronge, Saskatechwan
SOJ 1L0

Uranium
86 O/3, 6, 7
$67^{\circ}02'$ - $67^{\circ}20'$N
$115^{\circ}00'$ - $115^{\circ}24'$W

REFERENCES

Baragar and Donaldson (1973); Findlay and Smith (1966); Fraser (1973); Hoffman (1980, a and b); Hoffman and others (1978, 1980); Irvine (1970, 1971); Kerans and others (1981); Smith (1962).

PROPERTY

AM; AM-1; BK; BUCK; CF; CM; CM-1; FOX; KB 1; LOX; MOX; NP; POX; PU; ROX; SOX; UKE.

LOCATION

The properties extend from All Night Lake to the vicinity of Melville Creek, 510 km to 540 km northerly of Yellowknife (Fig. VI-1). The KB-1 claim is north of Melville creek and 5 km north-northwest of the remaining claims, which form a block to the south of the creek. The eastern part of the KB-1 claim is on 86 O/7.

HISTORY

SERU Nucleaire Ltee. Explored 86 O/3, 7 in 1976 (as Prospecting Permits 430 and 431), by geological reconnaissance mapping and helicopter-borne radiometric surveys. They relinquishd the ground in 1977.

Uranerz Exploration and Mining staked a roughly 22 by 9 km area in 1977. From southeast to northwest the claims staked were the NP, PU, CM, BK, and CF. In July, 1978 Uranerz recorded the MOX, BUCK, and UKE claims on the northeast side of the LOX, SOX, ROX,AM-1, POX, CM-1 and FOX claims on the southeast side of 1977 claims. Both groups of claims are again listed from southeast to northeast.

In August, 1978 Uranerz recorded the KB-1 claim. Noranda Exploration Co. Ltd. recorded the RUN 1-3 claims between Uranerz's main block of claims and the KB-1 claim in February, 1978.

DESCRIPTION

The project area is underlain by Aphebian sediments of the Epworth Group, paleo-Helikian sediments of the Hornby Bay Group (in the All Night Lake area) neo-Helikian sediments of the Dismal Lakes Group and by rocks of the largely ultramafic and mafic Muskox Intrusion. South of Melville Creek, much of the northwestern margin of the property is underlain by basalt flows (with minor intercalated sandstone) of the neo-Helikian Copper Creek Formation. a granitiod body related to the Hepburn Batholith underlies much of the AM, CM and part of the BK, and CF claims west of the Muskox Intrusion.

The age of the Muskox Intrusion was generally regarded as post-Hornby Bay Group and pre-Dismal Lakes Group (Irvine, 1970). A recent review has tentatively assigned it an age similar to that of the Copper Creek Formation (Hoffman, 1980b). The argument centres on the contention that the northeastern branch of the extensional Canoe lake fault (Hoffman 1980a) is the more important of the two branches that separate northward from the stem, just west of All Night Lake. The unmetamorphosed nature of the Dismal Lake Group dolostones close to the western margin of the Muskox Intrusion is attributed by Hoffman to fault displacement from their original position, remote from the zone of contact metamorphism whereas Irvine (1970) considered that the silicious dolostones are unmetamorphosed simply because they postdated the intrusion.

The age of the Muskox Intrusion relative to the Dismal Lakes Group may be significant in uranium exploration. Its intrusion would undoubtedly affect ground water circulation in the Dismal Lakes Group sediments either by thermal convection (if it postdated the Dismal Lakes Group) or by a ponding effect. The subject is therefore discussed at some length in the light of mappimg by Uranerz.

CURRENT WORK AND RESULTS

Geological mapping at 1:31,680 explored the claims and a surrounding area up to 7 km from the property boundary. The mapping shows the Epworth Group in the project area to include (from older to younger formations) metabasalts of the Vaillant Formation overlain by, and intercalated with, cherty dolostones of the Stanbridge Formation, meta-argillite, chlorite schist, quartzite with minor congolomerate, greywacke and quartz hematite breccia of the Odjick Formation, and black shales and pelites of the Fontano Formation. The vaillant Formation occupies the core of the Cloos Anticline and the Odjick and Fontano Formations are exposed on the anticlines western flank (Hoffman and others,1978)

The Muskox Intrusion extends some 18 km north-northeasterly through the claims, south of Melville Creek. It outcrops sparsely over a width of roughly 6 km at the southern margin of the property, but is only 1 km wide in the central and northern part of the project area and does not outcrop north of the FOX claims. In the northern part of the main claim block it is separated by a roughly 2 km-wide belt of Epworth Group metasediments and metavolcanics from a body of Aphebian granitiod rock. On the AM and AM-1 claims the belt is displaced northeasterly and for nearly a kilometre the Muskox Intrusion is in contact with granitiod rock.

Much of the northwestern part of the property (the MOX, PU, BUCK, UKE, CM, BK, CF, and KB-1 claims) is underlain by sandstones with minor conglomerate and black shale and overlying massive and laminated dolostones of the Dismal Lakes Group. The above lithologies would appear to represent the entire Dismal Lakes succession which therefore must be present in the project area.

Comparison of Uranerz 1:31,680 mapping with mapping by the Geological Survey of Canada (Irvine, 1970; Baragar and Donaldson, 1973; Hoffman, 1980b; Kerans and others, 1981) show marked differences. Because this area has only recently become of interest for uranium exploration it is worthwhile examining the differences in some detail. The main problem is whether or not Hornby Bay Group (unit 8) sandstone outcrops east of the eastern branch of the Canoe Lake Fault. Uranerz mapping indicates that it does not, and all Helikian sandstone in the project area northeast of All Night Lake, including that metamorphosed by the Muskox Intrusion, is mapped as being of lower Dismal Lakes Group age. This supports Hoffman's suggestion that the Muskox Intrusion is of neo-Helikian age, and possibly co-magmatic with basalts of the Copper Creek Formation. Hoffman (1980b) however follows Baragar and Donaldson (1973) in showing some unit 8 sandstone of the Hornby Bay Group east of the eastern branch of the Canoe Lake Fault.

Uranerz mapping implies an easterly downthrow on both the stem and the western branch of the Canoe Lake Fault. This is opposite to the westerly downthrow indicated by Smith (1962) and Hoffman (1980a). A scissors movement on the Canoe Lake Fault, hinged somewhere south of All Night Lake, would account for the apparent discrepancies.

Mapping by Uranerz geologists indicated a relatively short northward persistence of the eastern branch of the Canoe Lake Fault (2 km NNW of All Night Lake) compared with Geological Survey maps which indicate that it persists up to25 km north-northeast of All Night Lake. Several northwesterly striking faults of varying (possible dip slip) displacement have been mapped by Uranerz between All Night Lake and Melville Creek. These cut the inferred northward extension of the eastern branch of the Canoe Lake Fault as plotted by Irvine(1970) and Hoffman (1980b).

Sparse and unevenly distributed outcrop may make it very difficult to resolve these geological problems, however detalied the mapping.

One hundred and fifty water and 150 lake

sediment samples were collected throughout the project area. The sampling detected a few anomalies but follow-up did not discover uranium mineralization. Two lake water anomalies may be related to black shales of the Fontano Formation which have a high background uranium content.

Much of the project area was explored by helicopter-borne radiometric surveys. Though numerous uranium anomalies were detected and all were checked by ground prospecting, none were traced to uranium showings. A 2 km by 21.7 km area west of the Muskox Intrusion, and extending north-northeasterly through the main claim block, was covered by a grid with cross lines at 100 m intervals. Scintillometer readings were taken every 50 m along the grid crosslines. This survey discovered uranium mineralization at three locations; at Duke Creek near the junction of the BK, CM and CM-1 claims, about 2 km northwest of the northern end of the Muskox Intrusion; at Osprey Gorge, on the main grid base line where it crosses the CF claim at 19.4 km north, and near Drill Lake in the southern part of the main claim block. In the Duke Creek area on the BK claims numerous slightly radioactive boulders and two small outcrops mineralized with uranium were found. The angular boulders do not form a distinct train and are probably locally derived. Most are quartzitic and presumably derived from the Odjick Formation. A 42 line-km grid was constructed, covering parts of the BK, CM and CM-1 claims. Radiometric, magnetometer, EM, IP-resistivity (over EM conductors), and Track Etch surveys explored the Duke Creek grid. A detailed geological survey showed that pockets of uranium mineralization are present in the Aphebian granite near the Aphebian-Helikian unconformity.

At Osprey Gorge a small uranium showing with small diffuse patches of mineralization is hosted by Helikian sandstones, and in the Drill Lake area a small veinlet containing uranium minerals cuts chlorite schist of the Odjick Formation.

Presumably as a result of regional reconnaissance of the Helikian-Aphebian unconformity, Uranerz recorded the CS 1-3 claims, adjacent and to the east of the KB-1 claim in October, 1978, and the AR-7 claim farther to the east on 86 O/7, in November, 1978. At the same time the AR 1-6 claims were recorded on 86 O/8.

CHAPTER VII

SLAVE STRUCTURAL PROVINCE

J.B. Seaton
District Geologist, Mackenzie Region
D.I.A.N.D. Geology Office, Yellowknife

This Introductory section to the Slave Province is essentially the same as that in the 1977 Mineral Industry Report, with an updated list of general references and some modifications in the list of subdivisions under which properties are discussed.

Less than two-thirds of the Slave Structural Province is made up of metasediments and metavolcanics which range from greenschist to upper amphibolite facies (Frith, 1978; Nielson, 1978; Percival, 1979; Thompson, 1978). The supracrustal rocks, of which about 15% are volcanics, are exposed in sinuous and anastomosing belts locally wrapped around basement gneisses, and commonly flanked, separated or interrupted by intrusive quartz-diorite, quartz-monzonite and granite. Relatively narrow volcanic belts containing various proportions of mafic, intermediate and felsic components are commonly flanked on one, or rarely on both sides, by metasediments. The metasediments are predominantly greywacke, commonly interbedded with thinner pelitic layers with phyllitic or slaty cleavage. Topographically recessive phyllite may overly the volcanics or may be found locally within the volcanic sequence.

Contact relations of granitoid plutons with surrounding supracrustal rocks range from concordant to markedly crosscutting (Henderson, 1976). Locally the plutons are bordered by migmatite and metamorphic aureoles may be wide or practically absent. Many larger plutons are multilobed in outline. Massive granodiorites and quartz-monzonites with associated pegmatite and strongly crosscutting relationships to the wall rocks have been mapped, but appear to be of small volume.

Mineral discoveries have been mainly in volcanic rocks and consequently these rocks have been more closely studied during exploration. Most of the volcanic belts have been covered - in many cases more than once - by airborne magnetometer and EM surveys. These surveys have outlined numerous long formational conductors related to graphitic volcanogenic sediments or extensive zones of disseminated sulphides.

The extent of pre-Yellowknife Supergroup basement is still speculative, and will remain so until more geochronological studies and detailed mapping have been done. Locally, plutonic gneisses and massive rocks of tonalitic composition unconformably underly supracrustal rocks of the Yellowknife Supergroup as at Point Lake (Baragar and McGlynn, 1976; Henderson, 1975; Henderson and Easton, 1977). Commonly the basal contact of the Yellowknife Supergroup has been obliterated by granitic intrusions. Broad zones of granitic gneiss, migmatite and mixed gneisses including or derived from Yellowknife Supergroup rocks (unit An of McGlynn, 1977) may include basement so far unrecognized. Some tonalitic clasts in the Yellowknife Supergroup sediments may be derived from unroofed synetectonic plutons.

Volcanic belts may comprise more than one cycle of volcanism, e.g. the Back River volcanic complex and the Courageous Lake volcanic belt. The volcanics in some, if not all cases, interfinger distally with the sediments which fill the greater part of the basins. Iron formations within the sediments may be distal products of volcanism. The sediments clearly show complex folding whereas in the more competent volcanics the effect of such folding is obscure.

Selected references relating to specific parts of the Slave Province or to individual properties are listed in the appropriate sub-sections. Some general references on the Slave Province and some which, by their nature, do not lend themselves to inclusion in regional sub-sections (for example, regional geochemical or airborne radiometric surveys by the Geological Survey of Canada) include: Allan and Cameron (1973); Allan, Cameron and Durham (1973 a, b, c); Baragar (1966); Baragar and McGlynn (1976); Cameron (1980); Darnley (1973); Darnley and Grasty (1972); Frith (1980); Frith and Percival (1978); Frith and others (1977); Frith and Roscoe (1980); Henderson (1972, 1975a, b, 1976, 1978); Henderson and Easton (1977); Henderson and Thompson (1980); Heywood and Davidson (1969); Krogh and Gibbins (1978); Lambert (1977, 1978); Lambert and Henderson (1980); Lord (1941, 1942, 1951); McGlynn (1977); McGlynn and Henderson (1970, 1972); McGlynn and Ross (1963); Nikic and others (1975); Richardson and others (1973, 1974); Ross (1966); Stockwell (1933) Thompson (1978); Tirrul and Bell (1980).

Properties and projects have been grouped under the following headings and sub-headings, under which they are reported in alphabetical and numerical sequence of N.T.S.:

BASE METALS AND SILVER

COURAGEOUS LAKE-MACKAY LAKE VOLCANIC BELT	Noranda Exploration Company Limited	Tundra PROJECT	75M, 76D
AYLMER LAKE-VOLCANIC BELT	Getty Canadian Minerals Limited	LAC, DVT Claims	75N,76C,76D
BACK RIVER VOLCANIC COMPLEX	Cominco Limited	FACE, MINOU, PALE Claims	76B, 76C
HACKETT RIVER VOLCANIC BELT	Noranda Exploration Company Limited	NIK, SI, CINDY, BULA Claims	76F, 76K
HIGH LAKE SUPRACRUSTAL BELT	Noranda Exploration Company Limited	BO Claims	76L
POINT LAKE (EAST) AND POINT LAKE-PROVIDENCE LAKE SUPRACRUSTAL BELT	Hudson's Bay Oil & Gas Co. Limited	KEY, SOL, HOK, JAN Claims	86A
	Texasgulf Inc.	DEL claims, Prospecting Permit 465	86A, 86H

YELLOWKNIFE SUPRACRUSTAL BASIN

LITHIUM AND RARE MATERIALS, BASE METALS, SILVER

BEAULIEU RIVER-CAMERON RIVER SUPRACRUSTAL BELT	Worldwide Truck & Equipment Limited	A and B Claims	85I
YELLOWKNIFE SUPRACRUSTAL BASIN, SEDIMENTS	Hemisphere Development Corporation	ELK, PAINT, GIL Claims	85I
	Canadian Superior Exploration Ltd.	THOR, KI, LU VO NITE Claims	85I

GOLD

YELLOWKNIFE SUPRACRUSTAL BASIN, SEDIMENTS	Erickson Consultants Limited	AS Claims	85I
YELLOWKNIFE VOLCANIC BELT	Geophysical Surveys Limited	YT, ANN Claims	85J
INDIN LAKE BELT	S.M. Paulson & Associates	KEP Claims	86I

Figure VII-1 shows the Slave Structural Province and the N.T.S. system used to organize the property descriptions that follow. Properties whose descriptions do not refer to a figure can be located by N.T.S. reference on Figure VII-1. Figures VII-2 and VII-3 are geological maps showing properties in the Mackay-Point Lake Area and in the Hackett-Back River area.

BASE METALS AND SILVER

COURAGEOUS LAKE-MACKAY LAKE VOLCANIC BELT

This belt is roughly 60 km long and 5 km wide and trends northwesterly from the vicinity of Nodinka Narrows, on MacKay Lake, to near the north end of Courageous Lake, detailed sketch Figure VII-2.

TUNDRA PROJECT	Base metals, silver
Noranda Exploration Co. Ltd.	75 M/14,15 76D/3,6
P.O. Box 1619,	63°56' - 64°24'N
Yellowknife, N.W.T.,	110°10' - 111°20'W
XOE 1HO	

REFERENCES

Folinsbee (1949); Lord (1951); Moore (1956); McGlynn (1971); Seaton (1978, 1982); Seaton and Hurdle(1978).

PROPERTY

112 BIG claims; BUD 10; DEB 1-24; FAT 1-67; 15 LEAN claims; 51 MED claims; SMALL 1-14; STOUT 1-50; TALL 1-63; WEE 1-20.

LOCATION

The claims are roughly 240 km northeasterly of Yellowknife (Fig. VII-2)

HISTORY

Following an airborne EM and magnetometer survey in 1976, Noranda staked much of the western part of the Courageoous Lake-Mackay Lake volcanic Belt.

The BIG and SMALL claims were recorded in November, 1976; the DEB, FAT, MED, STOUT and WEE in April,1977; and the LEAN 1-6 TALL and THIN claims in July, 1977. In May and June, 1978, eight more claims were added to the LEAN group. The BUD 10 claims were staked in 1970 and later acquired from C. Vaydik.

Work during 1977 is described in the 1977 Mineral Industry Report (Seaton, 1982).

DESCRIPTION

The properties cover part of the Courageous Lake-Mackay Lake volcanic belt. The regional geology has been described by Folinsbee (1949) and Moore (1956). Other references cited cover the exploration history of the belt.

CURRENT WORK AND RESULTS

A gravity survey and diamond drilling explored targets on the BIG claims. Magnetometer, vertical and horizontal loop EM, a gravity survey and diamond drilling explored parts of the BUD-SMALL claim block. A total of 272.3 m was drilled in four holes. Geological mapping, various types of EM surveying, magnetometer and gravity survey covered a grid in the southeastern part of the SMALL claims.

Geological mapping, various types of EM surveying, magnetometer and gravity surveys explored grids on the DEB claims, and on the TALL claims which adjoin them to the east. Much of this work was a continuation and expansion of surveys started in 1977. Two drill holes totalling 134 m tested conductors on the TALL claims.

Various types of EM surveys and magnetometer surveys explored grids in the northern part of the STOUT claims. Gravity surveys explored the eastern of the two grids on the northern STOUT claims, and two grids on the FAT claims which adjoin and lie north of the STOUT claims. A 0.2 milligal anomaly coincident with an EM conductor and a magnetic feature was delineated in the northeastern part of the STOUT group. A gravity survey explored a grid on claims LEAN 3-6, in the southern part of the LEAN group. Roughly 2.75 km north of this grid a 59.46 m drill hole penetrated mainly rhyolite tuff which is locally graphitic and pyritic.

A grid in the northern part of the MED claims and just south of the LEAN group was explored by EM (vertical loop and horizontal shootback methods), a magnetometer survey and three lines of gravity surveying. A coincident EM conductor and gravity anomaly was tested by a 61.51 m drill hole which intersected pyritic and graphitic sections in rhyolitic tuff.

A 2.9 by 1 km grid in the northwestern part of the THIN claims (which adjoin the MED claims to the north, the STOUT claims to the south and the FAT claims to the east) was explored by geophysics and drilling of a 61.51 m hole. This drill hole intersected a narrow zone of graphitic tuff. For 1978 geophysics the 1977 baseline was extended north-northeasterly for 0.8 km

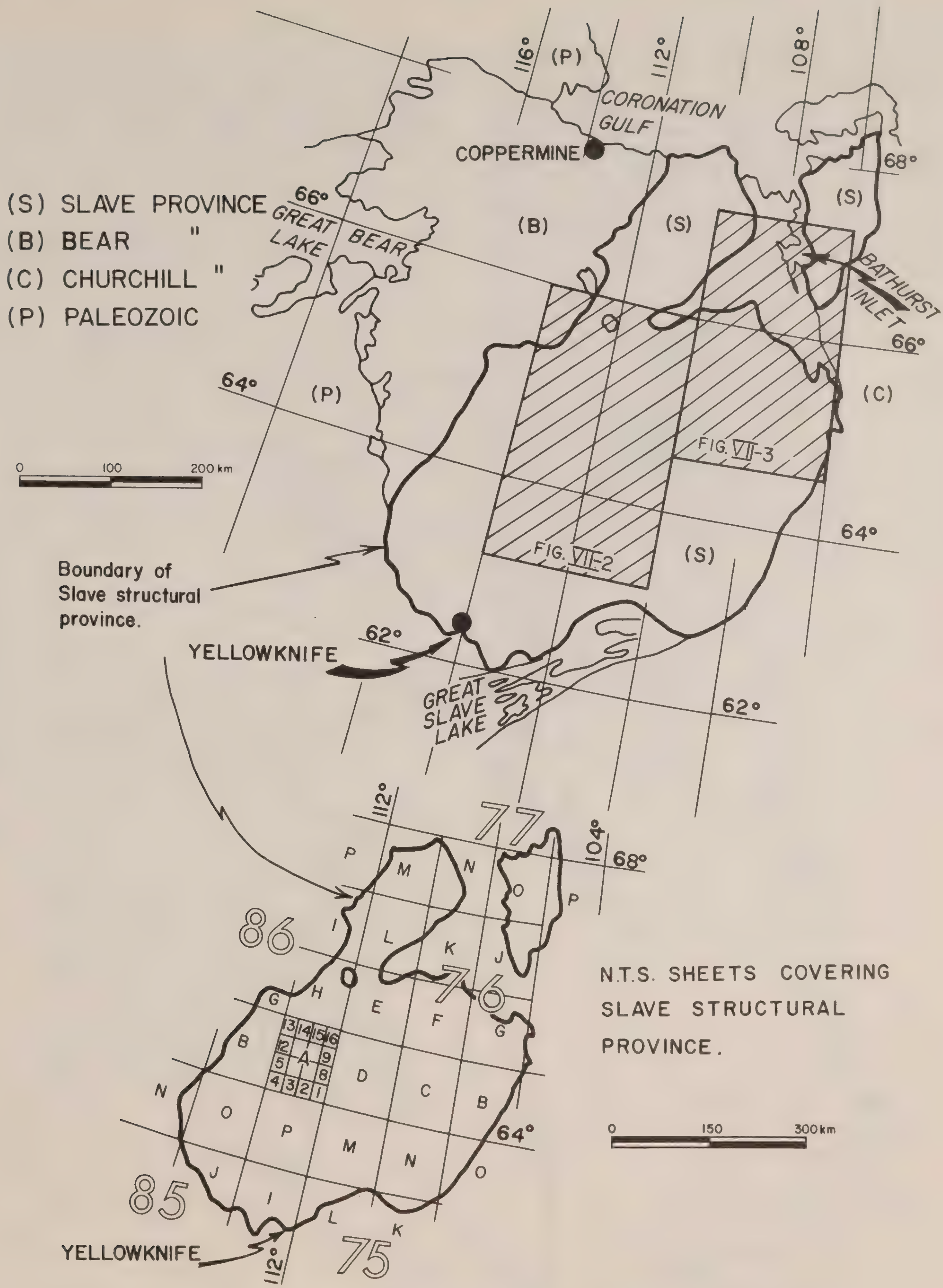


Figure VII-1: Location key to figures and N.T.S. sheets covering Slave Province.

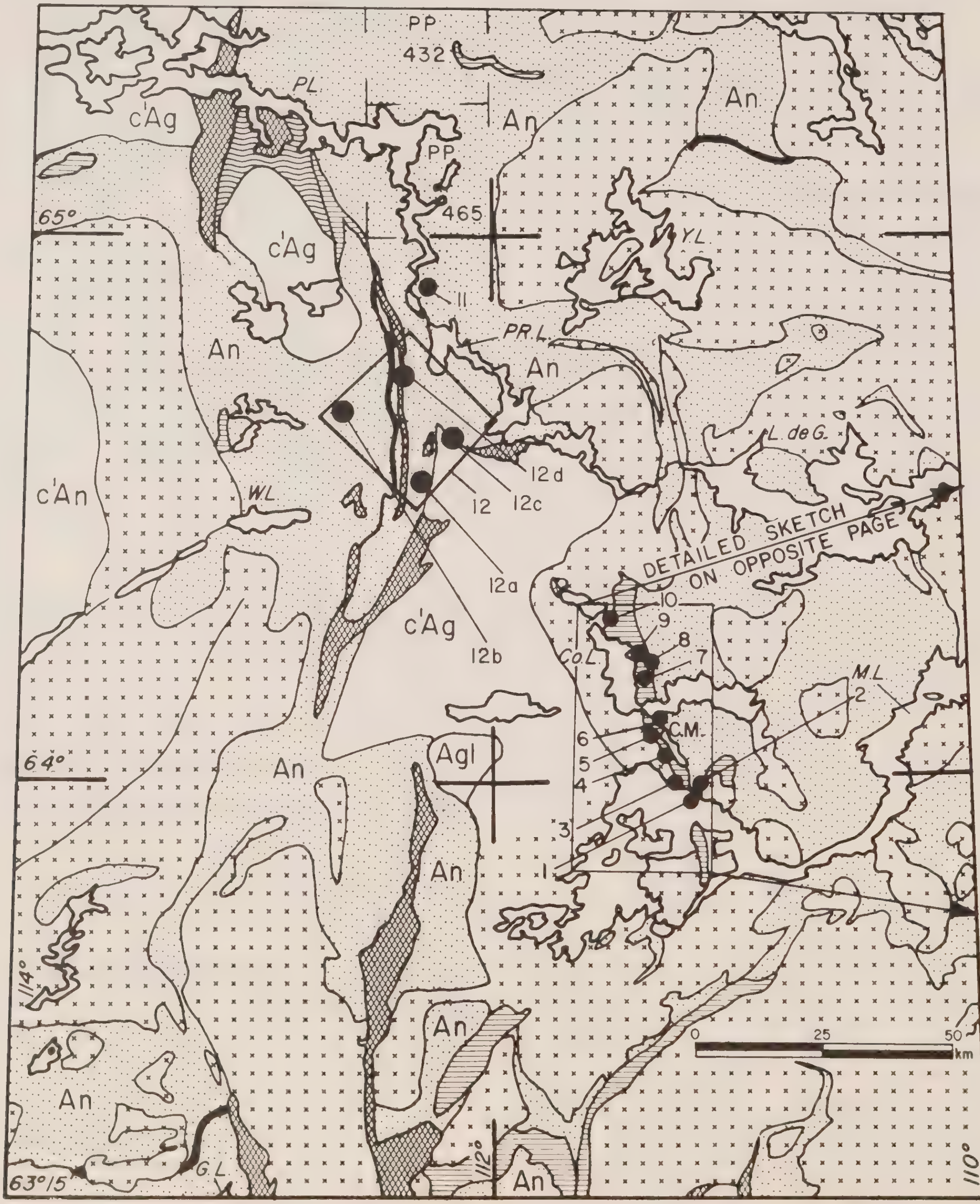
over the ice of Courageous Lake bringing its total length to 2.9 km.

EM (horizontal shootback, vertical loop and VLF) and a magnetometer survey explored the THIN claim grid. Several conductors, some with corresponding magnetic highs, were delineated in the north central part of this grid (on land within 500 m of the shore of Courageous Lake). This area was selected for a gravity survey. A 0.3 milligal positive gravity anomaly, coincident with an EM conductor and a positive magnetic anomaly was tested by a 61.52 m drill hole.

On the WEE claims gravity surveys tested conductors detected in 1977 on grids in the central and southern parts of the claim block. Targets on these grids - that on the southern grid shows a coincident EM conductor and positive gravity anomaly - were tested by two holes of 61.52 m and 62.12 m.

A grid in the eastern part of the WEE claims was explored by EM, magnetometer and gravity surveys.

North of Courageous Lake on the BIG claims in the vicinity of 64°16'N, 119°25'W gravity surveying of two lines was followed by a total of 106 m of diamond



DV MAY '81

drilling in two holes.

Though drilling on the various claim groups locally intersected a few metres of massive sulphides, in the form of pyrrhotite, pyrite or both, important intersections of base metals were not reported. Traces of copper and zinc, generally 0.1% or less, commonly accompany the massive iron sulphides.

AYLMER LAKE VOLCANIC BELT

This belt is roughly circular and rings a pluton of roughly 20 km diameter. The belt is approximately 2 km wide. It lies south of the eastern arm of Aylmer Lake.

DVT AND LAC CLAIMS

Getty Mines Limited,
600, 10 King Street E.,
Toronto, Ontario, M5C 1C3

Base Metals
75N/16, 75O/13, 76C/1
63°53'N - 64°03'N
107°58'W - 108°25'W

REFERENCES

Folinsbee (1952); Lambert (1978); Lord and Barnes (1954); Wright (1957, 1967).

PROPERTY

DVT 1-366; LAC 1-16.

LOCATION

The claims form an incomplete ring centered roughly 355 km northeasterly of Yellowknife between Aylmer Lake and Lac de Charloit.

PROPERTIES/PROJECT AREAS:

1.	DEB	6.	FAT	11.	DEL
2.	TALL	7.	MED	12.	LAKE PROVIDENCE BEAUPARLANT LAKE PROJECT
3.	SMALL & BUD	8.	LEAN		12a. KEY
4.	STOUT	9.	WEE		12b. SOL
5.	THIN	10.	BIG		12c. HOK
					12d. JAN

I Grids

KEY TO PLACE NAMES (North to South)

P.L. Point Lake; Y.L. Yamba Lake; P.R. Providence Lake; L. de G. Lac de Gras; W.L. Winter Lake; Co. L. Courageous Lake; M.L. Mackay Lake; G.L. Gordon Lake (north end).

PROTEROZOIC (Aphebian) EG Epworth Group; GG Goulburn Group

ARCHEAN

Agl — Late or post tectonic granodiorites and quartz monzonites

Ag — Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided.

An — Granitic gneiss & migmatite & mixed gneisses involving Yellowknife Supergroup rocks

Metasediments, mainly greywacke turbidites, includes minor conglomerate & carbonate rocks.

yAvb — Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks.

yAv — Volcanic rocks, undivided

cAn, cAg — Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup.

cAg — Complex of plutonic gneisses, commonly of tonalite composition, in part cataclastic, that are basement to Yellowknife Supergroup. May include some younger plutonic rocks.

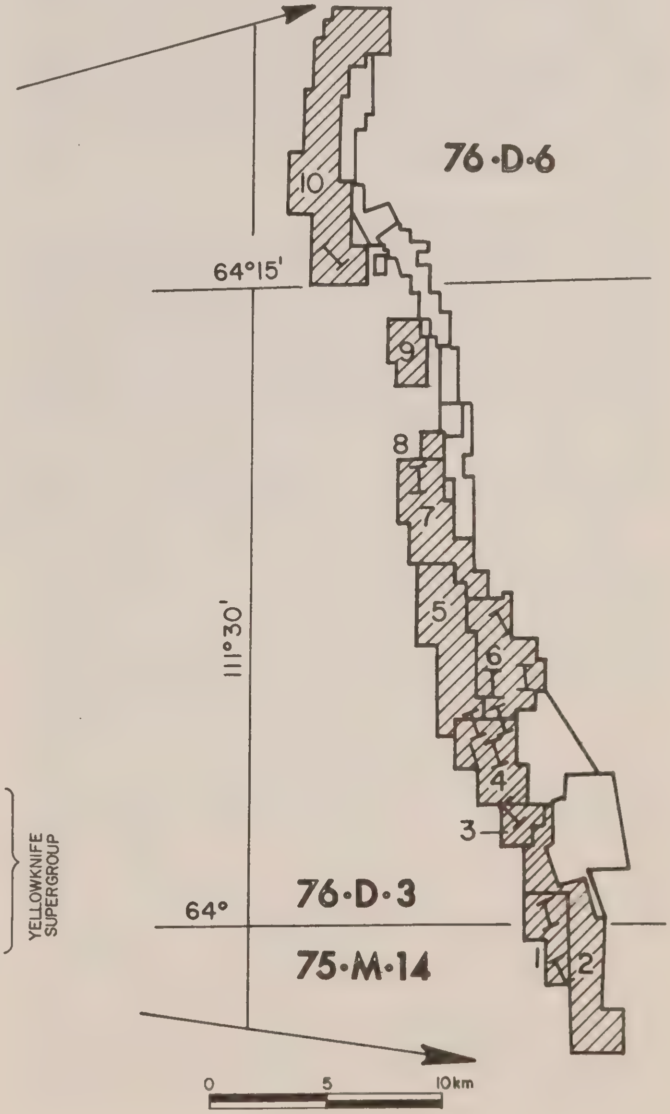


FIGURE VII-2: Part of central Slave Province showing property locations. Simplified geology after McGlynn, 1977.

HISTORY

Part of the area was first staked in 1961. In 1973 Great Plains Development Company of Canada Limited staked part of the area as ALE 1-63 but work was not reported. The DVT and LAC claims were recorded by Getty Mines Limited in August, 1977.

DESCRIPTION

A belt of felsic to mafic metavolcanics surrounds a crudely pentagonal granodiorite pluton in the north of 75 N/16 and the south of 76 C/1. The outer part of the volcanic belt is composed of felsic volcanics peripheral to which, throughout much of the area, are nodular quartz-mica schists of the Yellowknife Supergroup. The felsic volcanic-sediment contact has been staked as the DVT claims together with part of the adjoining felsic volcanics belt. To the southeast, on and adjacent to the LAC claims, the felsic volcanics are absent, and the volcanic belt is flanked on both sides by granodiorite (Folinsbee, 1952). In the north (on 76 C/1) the volcanics form the shoreline of Aylmer Lake for roughly 4 km (Lord and Barnes, 1954). Foliations in the volcanic belt peripheral to the pluton strike parallel to the granodiorite contact and dip either vertically, or moderately away from the pluton. An exception occurs in the northwest of the area where a northwesterly trending overturned anticline causes the bedding and foliation (here subparallel to the bedding) to dip locally towards the pluton.

CURRENT WORK AND RESULTS

The granodiorite pluton centred roughly at 63°57'N, 108°10'W, the peripheral volcanic belt and part of the adjoining largely metasedimentary area were mapped at 1:15,840. The granodiorite pluton surrounded by volcanics is described as post-tectonic and devoid of pervasive foliation, though locally grading into an augen gneiss at its contact with the volcanics. The smaller foliated granodiorite pluton to the south is described as pre-tectonic.

The mafic volcanics proximal to the larger pluton are intruded by several large sill-like bodies of gabbro which are grossly conformable with, but locally cross-cut, the volcanic units. One of these gabbroic bodies in the western part of the area is several kilometres long and as much as 250 m wide.

The mafic volcanics, like the stratigraphically overlying felsic (largely dacitic and rhyolitic units) include pyroclastics and lava flows. The pyroclastics range from tuff, through lapilli tuff to tuff breccia.

An ash flow tuff unit extends for a strike length of over 3 km near the western side of the volcanic belt. It is overlain by a carbonate unit which interfingers with felsic tuff. The ash flow tuff has a maximum thickness of approximately 250 m and the overlying carbonate unit, which has a strike length slightly less than the underlying ash flow, attains as much as 200 m thickness. The ash flow is reported to overlie pillowed dacite and to contain 5% - 30% block sized fragments and 10% - 50% lapilli sized fragments of mainly dacitic composition. Pumice fragments are abundant at the top of the thick central part. The matrix is amphibole rich tuff. As much as 50% ash and lapilli may be present in the overlying carbonate, with rhyolitic to dacitic fragments predominating.

A 300 m long by 15 m wide metaconglomerate is reported on the southern margin of the volcanic belt at the volcanic-sediment contact. The conglomerate contains quartzite clasts.

The volcanic belt has features in common with other belts in the Slave Province. Of special interest are the pumice-bearing ash flow tuffs reminiscent of parts of the Back River Volcanic Complex, and gabbroic sill like intrusions common in the mafic volcanics of the Courageous Lake-Mackay Lake volcanic belt.

East-northeasterly striking diabase dykes cut the plutons and supracrustal rocks.

A horizontal loop EM survey explored grids whose baselines are parallel to the trend of the annular volcanic belt. Conductors were found to be almost continuous for roughly 50 km along the belt. The conductive zones, broken only by a few gaps, total about 7 km in length. Some shorter conductors range from weak (less than 1 mho) to strong (more than 25 mhos). Although conductors reach 100 m in width, they are commonly in the range of 20 m to 50 m wide. The longer conductors are at or near the metavolcanic-metasediment contact. Eleven drill targets selected mainly on the results of the EM work are in the northern, western and southern parts of the DVT claims. Five of the conductors chosen as targets had coincident magnetic anomalies. Altogether 27 line-km of magnetometer surveying tested selected conductors.

Soil sampling was used to test selected conductors. Samples were analysed for copper, lead, zinc and silver. Forty-one rock chip samples were analyzed for the same metals and gold. The geochemical surveys showed contrasts in metal content of different rock types, but did not find anomalies thought to be indicative of sulphide deposits.

BACK RIVER VOLCANIC COMPLEX

The Back River volcanic complex is roughly 40 km long and 15 km wide. It trends northwesterly and underlies the adjoining corners of N.T.S. 76B, 76C, 76F and 76G.

PALE CLAIMS	Silver, lead, zinc
Cominco Limited,	76 C/16
2000 Granville Square,	64°53'N, 108°00'W
Vancouver B.C.,	
V6C 2R2	

REFERENCES

Lambert (1977b,1978); Seaton and Hurdle (1978); Seaton (1982).

PROPERTY

PALE 1-53

LOCATION

The claims are roughly 400 km northeasterly of Yellowknife and 13 km north-northeasterly of the Back and Contwoyto Rivers (Fig. VII- 3). The area drilled in 1978 is approximately 64°48'N, 108°00'W.

HISTORY

The PALE group was staked in 1975 and 1976. Exploration from 1975 to 1977 has been described in previous Mineral Industry Reports (Seaton and Hurdle, 1978; Seaton, 1982), and included the drilling (in 1977) of 10 holes to test the Pale silver, lead and zinc showing. Only 5 of these holes were reported in the 1977 Mineral Industry Report.

DESCRIPTION

The claims are in the southwestern part of the Back River volcanic complex, which has been described by Lambert (1977, 1978). The claims are mainly

underlain by felsic and intermediate volcanics. Host rock of the Pale showing is fractured rhyolite (Seaton, 1982).

CURRENT WORK AND RESULTS

Three drill holes (P11, P12 and P13) totalling 1025 m, were drilled to test depth extensions of the Pale showing.

Hole P11 drilled 130 m northwest of the surface showings encountered no mineralization.

Holes P12 and P13 drilled below previous mineralized intersections in the main part of the zone encountered broad sections of very low-grade silver and base metal mineralization in the fractured rhyolite host.

HACKETT RIVER VOLCANIC BELT

The Hackett River Volcanic belt (Frith and others, 1977) extends southerly for 100 kms from the confluence of the Mara and Hackett Rivers almost to Mallay Rapids on the Back River. In the Hackett River area the volcanics outline a major syncline the north limb of which contains the Bathurst Norsemines deposits. The regional geology has been described by Bryan and Scarfe (1978), Frith and Hill (1975), Frith and others (1977), Frith and Percival (1978), Jefferson and others (1976).

NIK CLAIMS — Base metals, silver
Noranda Exploration Co. Ltd., — 76 F/15
P.O. Box 1619, — 65°58'N, 108°37'W
Yellowknife, N.W.T.
XOE 1HO

REFERENCES

Bryan and Scarfe (1978); Frith and Hill (1975); Frith and others (1977); Frith and Percival (1978); Jefferson and others (1976).

PROPERTY

NIK 1-4

LOCATION

The claims are on the Mara River and roughly 480 km northeasterly of Yellowknife (Fig. VII-3).

HISTORY

In June, 1977 Noranda commenced geological reconnaissance to the north and west of the Bathurst Norsemines silver-base metals property. Selected blocks of the reconnaissance area were explored by airborne EM (Input method) and magnetometer surveys. In July, 1977 Noranda staked the NIK claims to cover conductors found by the airborne survey.

DESCRIPTION

Though there is no outcrop on the NIK claims regional geological trends suggest that, beneath the glacial overburden, the claims are largely if not entirely underlain by felsic to intermediate metavolcanics. Large outcrops of granitoid rock roughly 1 km northeast and southeast of the claims, suggest that a granitoid pluton borders the property to the east.

The claims are 12.5 km west of the Hackett River gneiss dome (Bryan and Scarfe 1978), lie on the northeastern limb of the Hackett River syncline, and are roughly on strike with and to the northwest of the various Bathurst Norsemines silver-base metal deposits.

The regional geology has been mapped at 1:31,680 (Jefferson and others, 1976). Structural and metamorphic aspects have been discussed by Frith and others (1977).

CURRENT WORK AND RESULTS

Geological mapping at 1:31,680 covered much of the area from 65°53'N-68°08'N and 108°00'W-108°50'W, including the NIK claims.

Crone Shootback EM and horizontal loop EM employing different frequencies and coil separations delineated a northerly trending conductor in the southern part of the claims.

A magnetometer survey did not outline any anomalies.

SI CLAIMS — Base metals
Noranda Exploration Co., Ltd., — 76 F/15
P.O. Box 1619, — 65°56'N, 108°40'W
Yellowknife, N.W.T.,
XOE 1HO

REFERENCES

Bryan and Scarfe (1978); Frith and Hill (1975); Frith and others (1977); Frith and Percival (1978); Jefferson and others (1976).

PROPERTY

SI 1-77

LOCATION

The property is roughly 475 km northeasterly of Yellowknife on the Mara River (Fig. VII-3).

HISTORY

In June, 1977 Noranda commenced geological reconnaissance to the north and west of the Bathurst Norsemines silver-base metal property. Selected blocks of the reconnaissance area were explored by airborne EM (Input method) and magnetometer surveys. In July, 1977 Noranda staked the SI claims to cover conductors found by the airborne surveys.

DESCRIPTION

The claims are centred roughly 15 km west of the Hackett River gneiss dome (Bryan and Scarfe 1978) and are on the southern limb of the Hackett River Syncline. The several silver-base metal deposits of the Bathurst Norsemines property lie between the SI claims and the Hackett River gneiss dome, on the northern limb of the Hackett River syncline.

The property is largely underlain by felsic to intermediate volcanics, flanked at or near the southern and western claim boundaries by intrusive granitoid rocks (Jefferson and others, 1976).

Regional structure and metamorphism are discussed by Frith and others (1977). In the claim area rock units strike west-northwesterly, and there is a north-northwesterly foliation.

CURRENT WORK AND RESULTS

Geological mapping at 1:31,680 covered much of the area from 65°53'N-66°08'N and 108°00'W - 108°50'W, including the SI claims.

CINDY CLAIMS
Noranda Exploration Co. Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T.,
XOE 1HO

Silver, Base metals
76 F/15, 76 K/2
66°00'N, 108°40'W

REFERENCES

Bryan and Scarfe (1978); Frith and Hill (1975); Frith and others (1977); Frith and Percival (1978); Jefferson and others (1976).

PROPERTY

CINDY 1-60

LOCATION

The claims are on the east shore of a large lake just north of the easterly bend in the Mara River, 480 km northeasterly of Yellowknife (Fig. VII-3).

HISTORY

In June, 1977 Noranda commenced geological reconnaissance to the north and west of Bathurst Norsemines silver-base metals property. Selected blocks of this reconnaissance area were explored by airborne EM (Input method) and magnetometer surveys. In July, 1977 Noranda staked the CINDY claims to cover conductors found by the airborne survey.

DESCRIPTION

Roughly two-thirds of the claims are underlain by a 7 km-long lake. In the northeastern part of the claim block felsic to intermediate volcanics outcrop. Granite outcrops locally on the eastern margin of the claims. Felsic volcanics and tuffite outcrop on a promentory extending into the lake from the southern boundary of the claims.

Two conductor intercepts from the 1977 airborne EM survey are about 200 m apart on the promontory projecting southwest into the lake.

CURRENT WORK AND RESULTS

A grid with a 500 m northerly oriented baseline was surveyed to cover the conductors detected by the airborne survey.

The grid was geologically mapped at 1:2,500.

Magnetometer and Crone Shootback EM delineated a conductor partly coincident with a magnetic anomaly in an area underlain by felsic tuff.

BULA CLAIMS
Noranda Exploration Co. Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T.,
XOE 1HO

Silver, base metals
76 F/15,16; 76 K/1,2
65°59'N, 108°28'W

REFERENCES

Bryan and Scarfe (1978); Frith and Hill (1975); Frith and others (1977); Frith and Percival (1978); Jefferson and others (1976).

PROPERTY

BULA 1-70

LOCATION

The claims (Fig. VII-3) are on the Mara River, roughly 480 km northwesterly of Yellowknife, and about 8 km northerly of the Bathurst Norsemines silver-base metals deposits.

LEGEND

PROPERTIES

1. PALE Cominco Limited
2. NIK Noranda Exploration Company Limited
3. SI Noranda Exploration Company Limited
4. CINDY Noranda Exploration Company Limited
5. BULA Noranda Exploration Company Limited

PROTEROZOIC (HELIKIAN)

Paleohelikian diabase sheets

(B.T.) Bathurst Trough. Ellice and Tinney Cove Formations.

(KB) GOULBURN GROUP (APHEBIAN)
Rocks of Kilohigok Basin

Brown Sound Formation: red arkose, red mudstone, thin basalts, breccia diatremes and Amogok Formation

Burnside River, Quadyuk, Peacock Hills and Kuuvic Formations

Western River Formation: quartzite, mudstone, siltstone, arenaceous and stromatolitic dolomite, quartz pebble conglomerate.

(C) CHURCHILL STRUCTURAL PROVINCE
(ARCHEAN AND PROTEROZOIC)

(S) SLAVE STRUCTURAL PROVINCE
ARCHEAN

Quartz diorite, granodiorite, quartz monzonite and granite.

YELLOWKNIFE SUPERGROUP

Granitic gneiss and migmatite and mixed gneiss involving Yellowknife Supergroup rocks

Metasediments: mainly greywacke, mudstone turbidites, and knotted schists.

Acidic volcanics

Volcanic rocks, undivided

Basic to intermediate volcanics. Minor acidic volcanics

Complex of plutonic gneisses forming basement to Yellowknife Supergroup. May include some younger plutonic rocks

Note: Proterozoic rocks of the Kilohigok Basin and Bathurst Trough are part of the Bear Structural Province.

PLACE NAMES

B.I. Bathurst Inlet
N.L. Nose Lake
P.L. Providence Lake
R.L. Regan Lake
I.L. Index Lake
B.L. Bathurst Lake

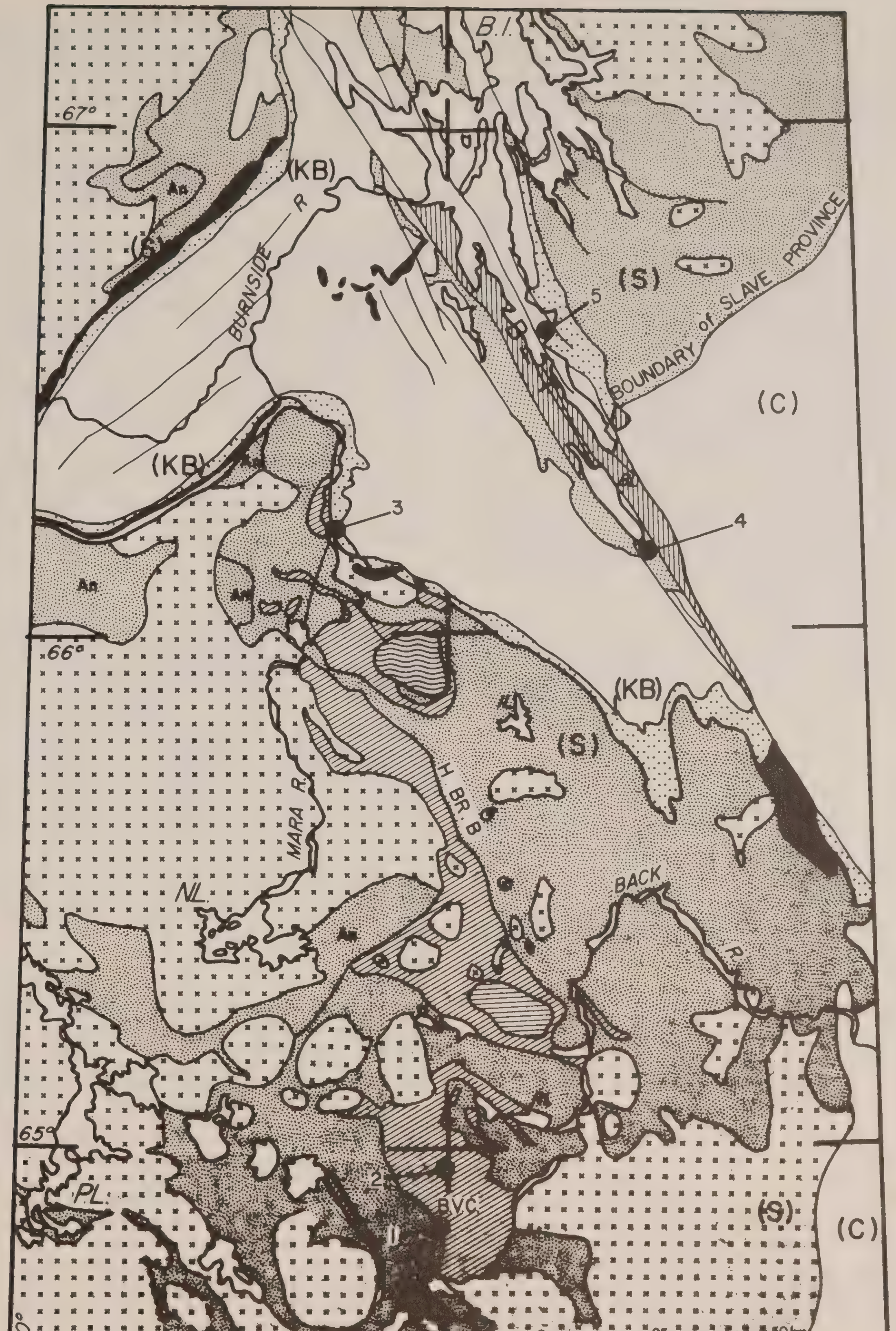


FIGURE VII-3: Eastern part of Slave Structural Province, Kilohigok Basin and Bathurst Trench with property locations. Geology simplified from McGlynn, 1977.

HISTORY

In June, 1977, Noranda commenced geological reconnaissance to the north and west of Bathurst Norsemines silver-base metals property. Selected blocks of the reconnaissance area were explored by airborne EM (Input method) and magnetometer surveys. In July, 1977 Noranda staked the BULA claims to cover conductors found by the airborne survey.

DESCRIPTION

The claims are mainly underlain by felsic volcanics, predominantly tuffaceous, but with minor lava flows. In the southwestern part of the claims the volcanics dip moderately to the east-northeast. In the northeastern part of the property dips are moderate and northerly. The southeastern part of the property lies along the northwestern margin of an oval granitoid pluton 3 km northwest of the Hackett River gneiss dome. The pluton is composed of medium to coarse grained granite and granodiorite. Eight conductors were found within a 0.5 km radius in the south-central part of the claims, roughly 1 km west of the inferred margin of the granitic pluton.

CURRENT WORK AND RESULTS

A grid with a 600 m north-northeasterly baseline and winglines extending 250 m from the baseline was surveyed by 1:2,500 geological mapping, Crone Shootback EM, and magnetometer. The grid was designed to cover all the conductors intercepted on the claims by the 1977 airborne survey.

The EM and magnetometer surveys delineated a conductor with coincident magnetic highs and lows on and just east of the baseline. Bedrock is not exposed along the conductor axis, which lies directly west of granodiorite outcrops.

HIGH LAKE SUPRACRUSTAL BELT

The High Lake Supracrustal belt is part of a northerly trending complex of volcanic rocks intruded to the west by extensive granitic plutons and flanked to the east by volcaniclastic, carbonate and turbidite sediments.

BO CLAIMS
Noranda Exploration Co. Ltd.,
P.O. Box 1619,
Yellowknife, N.W.T.
XOE 1H0

Base-metals, Silver
76 L/4
66°07'N, 111°45'W

REFERENCES

Fraser (1964); Gibbins and others (1977); Padgham, Caine and others (1978); Padgham and others (1975); Seaton (1978).

PROPERTY

BO 1-120

LOCATION

The claims are roughly 270 km north-north-easterly of Yellowknife.

HISTORY

Prospecting Permit 60 covering 76 L/4 was granted to Borealis Exploration Ltd. in 1968 and was explored prior to expiry in 1971 (Padgham, Caine and others, 1978).

In 1974 Prospecting Permit 336 covering 76 L/4 was granted to Long Lac Mineral Exploration Limited. During 1974 Long Lac mapped most of the permit area, (that part underlain by supracrustal rocks) and prospected part of it (Gibbins and others, 1975).

Long Lac Mineral Exploration explored parts of 76 L/4 in 1975 by airborne EM and by magnetometer, horizontal loop EM and VLF-EM ground surveys.

Long Lac recorded BO 1-120 in October, 1976 to cover several groups of anomalies, thought at the time to represent several discrete conductors, but later found to be parts of two main conductive zones.

DESCRIPTION

The property covers the southern end of the southwest segment of the High Lake supracrustal belt.

The claims are underlain by rhyolitic, dacitic and andesitic volcanics, and include tuffs and flows; the andesitic flows are typically pillowed. Much larger areas to the north and south of the claims are underlain predominantly by andesitic rocks. Granitoid rocks with minor volcanics underlie roughly 250 acres at the eastern end of the property.

The rocks underlying the claim group and roughly equivalent areas to north and south are isoclinally folded and dip steeply to vertically.

CURRENT WORK AND RESULTS

Work by Noranda in 1978 was done under an agreement with Long Lac.

In spring 1978, Noranda used vertical loop EM to investigate previously outlined conductors. Two main conductors were traced for roughly 10 km through the claims. These trend easterly at their western points where they veer to an east-northeasterly direction producing a 'horsetail' pattern. The more westerly of the two conductors was found to be locally coincident with graphitic and pyritic outcrops. Noranda's contention that the conductors are formational disagrees with Long Lac's mapping which indicates that the east trending sections of the conductors are roughly 20° to the local strike of the rocks and the east-northeastely sections are at 50° to the local strike. A 900 m-long conductor parallel, close to, and north of the central part of the western conductor coincides with a graphitic occurrence. The mapped pattern suggests an easterly striking fracture with east-northeasterly 'horsetail' that may follow fault zones.

Reconnaissance VLF-EM surveys tested several conductors detected by the airborne EM survey within and near the claim block. One of these on the two most westerly BO claims was found to correspond to a pyrrhotite-pyrite-graphite zone which trends north-northwesterly within felsic volcanics. The felsic volcanics presumably form a roof pendant within granitoid rocks which predominate in this area. VLF-EM tracing of another AEM conductor 1700 m to the east showed it is coincident with several short pyrite-pyrrhotite zones with minor graphite. An area around the Dogbone Lake copper-zinc showing was tested but no conductors traced. Dogbone Lake is roughly 4.5 km from the eastern end of the property and its northern end is at the northern boundary of the BO claims.

A grid was surveyed to cover an isolated airborne EM conductor intercept. The grid covers part of a small lake at 66°07'N, 111°36'W, and consist of a 500 m west-northwesterly baseline and six 400 m-long cross lines.

Horizontal Shootback EM and vertical loop surveys delineated a conductor at and close to the baseline. The conductor is near vertical and 200 - 300 m long. It has no magnetic expression. Pyritic and chloritic rhyolite boulders were found on the lake shore at the northern margin of the grid.

POINT LAKE (EAST) AND POINT LAKE-PROVIDENCE LAKE SUPRACRUSTAL BELT

This belt trends south for 80 km from the east end of Point Lake (Fig. VII-2). Metasediments and volcanics are flanked by wide zones of migmatite to their east and west. Migmatitic belts link the belt with the Beaulieu River - Cameron River supracrustal belt.

LAKE PROVIDENCE - BEAUPARLANT LAKE PROJECT — Base metals, silver — 86 A/9, 16
Hudson's Bay Oil & Gas Ltd.,
700-2nd Street S.W.,
Calgary, Alta., T2P 2W1

REFERENCES

Fraser (1969).

PROPERTY

HOK 1-6; JAN 1-24; KEY 1-8: SOL 1-40.

LOCATION

The properties are roughly 260 km to 285 km northeasterly of Yellowknife (Fig. VII-2). They are discrete claim groups within 25 km of the Hudson's Bay Oil and Gas 1977-78 base camp at Beauparlant Lake. Individual locations are:

Claims	NTS	Latitude	Longitude
HOK 1-6	86 A/9	64°37'N	112°22'W
JAN 1-24	86 A/9,16	64°45'N	112°22'W
KEY 1-8	86 A/9	64°33'N	112°17'W
SOL 1-40	86 A/9	64°40'N	112°20'W

HISTORY

The claims were recorded in July, 1977 following regional surveys which included airborne EM and magnetometer, ground geological and geochemical surveys.

Grids were constructed on all the claim groups and explored by 1:2,500 geological mapping, horizontal loop EM, magnetometer and geochemical surveys, which included soil sampling and rock chip sampling. Soil samples were taken from frost boils. Both soil and rock chip samples were analysed for copper, lead, zinc and silver.

The horizontal loop EM surveys delineated several northerly trending conductors and groups of conductors which locally coincide with northerly trending magnetic features. Drill target selection for 1978 was based largely on geophysical results.

DESCRIPTION

The claim blocks cover parts of a northerly trending supracrustal belt. Reports by Hudson's Bay Oil and Gas show the HOK claims underlain by amphibolite, amphibolite schist and banded amphibolite. Quartz-feldspar-biotite schist outcrops just north of the northeastern corner of the property. Minor showings of chalcopyrite and galena, and pyrrhotite and chalcopyrite are found in the north-central part of the HOK claims.

Maps of the eastern half of the JAN claims by Hudson's Bay Oil and Gas, show the area to be underlain by quartz-feldspar-biotite schist, amphibolite, amphibolite schist, minor rhyolite and rare carbonate exhalite. Granite gneiss, migmatite and granite are particularly prevalent in outcrop in the northeastern part of the claims, but scattered outcrops of granitoid rocks are found throughout the mapped area.

Traces of chalcopyrite and sphalerite were observed in float from the JAN claims.

The KEY claims are mapped as mainly underlain by amphibolite and by quartz-feldspar-biotite schist with cordierite and andalusite. The schistose metasediments outcrop in the southwestern part of the claims. Minor amounts of pyrrhotite, pyrite and sphalerite were found in felsic volcanics.

Rhyolitic rocks outcrop sparsely over much of the northern part of the SOL group. The southern part is mainly underlain by amphibolite and amphibolite schist. Float containing sphalerite-galena-chalcopyrite and assaying as much as 42 oz/ton Ag in one case, was noted between two conductors.

CURRENT WORK AND RESULTS

Drilling of the JAN, KEY and SOL claims did not find significant base metals or silver.

One 50 m hole drilled in the southeastern corner of the JAN group (JAN 19 claim) cut mainly biotite, quartz-biotite-sericite schist and quartz-biotite-chlorite schist. The schist was locally graphitic. The hole also cut granitic rocks and amphibolite. Graphite would appear to explain the conductor since sulphides were noted in trace amounts only.

Four holes, totalling 559 m, were drilled in the north-central part of the KEY group; three on KEY 2 and across the KEY 2-KEY 7 boundary. Amphibolite and felsic meta-volcanics were the main rocks intersected. The rocks are commonly chloritic and locally graphitic. As much as 1.29% Zn and 0.1% Cu was intersected in one hole over approximately 1 m. Several sections of massive pyrrhotite and pyrite were cut in one hole. Sulphides and graphite together adequately explain the geophysical anomalies which the holes were designed to test.

A 70 m hole on SOL 26, in the central part of the SOL claim block, cut quartz-feldspar-biotite schist and granite. Graphitic shear zones, disseminated graphite and graphite-filled fractures adequately explain the conductor tested. Only traces of sulphides were found and the core was not assayed.

DEL CLAIMS — Base metals, silver — 86 A/16 — 64°57'N, 112°16'W
Texasgulf Inc.,
Box 175,
5000 Commerce Court W.,
Toronto, Ont., M5L 1E7

REFERENCES

Bostock (1976); Fraser (1969); Seaton (1982).

PROPERTY

DEL 1-91

LOCATION

The claims (Fig. VII-2) are roughly 310 km north-northeasterly of Yellowknife, just north of Obstruction Rapids on the Coppermine River.

About a third of the property lies west of the Coppermine River.

HISTORY

The DEL claims were staked in 1977 to cover conductor intercepts detected during an airborne EM survey (Seaton, 1982, Point to Providence Lake Project).

DESCRIPTION

The claims cover part of a northerly trending supracrustal belt flanked to the west by granite gneiss with inclusions of amphibolite and quartz-biotite schist, and by migmatite including lit-par-lit gneiss. Similar migmatite flanks the supracrustal belt to the east. The supracrustal belt was mapped as greywacke, biotite-quartz schist and derived nodular mica quartz schist, and minor hornblende schist (Fraser, 1969). Mapping at 1:15,840 by Texasgulf Inc., of 64 sq. km surrounding the INC claims roughly 6 km to the north outlined widespread units of amphibolite so that metavolcanic units are more abundant in the DEL claims area than Fraser's 1:253,440 map indicates.

CURRENT WORK AND RESULTS

Two hundred and eighty-nine samples collected from four grids were analysed for copper, lead, zinc and silver. Normal sample intervals along cross lines of the grids were 40 m, reduced to 20 m intervals over gossans. The soil organic layer was avoided where possible.

The grids are arranged in a generally discontinuous Y-configuaration; the arms of the Y being formed by the northeasterly baseline of the DEL 5 grid and the southeasterly baselines of the DEL 24 and DEL 18 grids. The DEL 53 grid baseline extends east-southeasterly for 2.5 km from a point on claim DEL 53 about 100 m east of the Coppermine River. Together the grids covered the greater part of the property lying east of the Coppermine River.

Analyses were treated statistically to determine background and threshold values, and single point anomalies to broad anomalous zones were found on all grids.

PROSPECTING PERMIT 465 — Base metals
Texasgulf Inc., — 86 H/1
Box 175, — 65°05'N, 112°12'W
5000 Commerce Court W.,
Toronto, Ontario M5L 1E7

REFERENCES

Bostock (1976); Fraser (1969); King and others (1981).

PROPERTY

Prospecting Permit 465

LOCATION

The centre of the permit area is roughly 315 km north-northeasterly of Yellowknife. The property straddles the Coppermine River where it flows into Point Lake (Fig. VII-2).

HISTORY

Texasgulf Inc. reconnoitered this part of the Slave Province in 1976 and staked 50 INC claims, over a base metal showing previously explored by INCO Limited. The showing was drilled in 1977. Prospecting Permit 465 covering 86 H/1 was granted to Texasgulf in April, 1977.

Chalcopyrite and sphalerite-bearing frost heaved boulders were found by ground surveys done after a May 1977 AEM survey. Ground techniques included reconnaissance VLF-EM followed by magnetometer, EM and gravity surveys, soil sampling and geological mapping. These surveys explored the northern part of the HEK grid, which is centred at 65°05'15"N, 112°14'22"W.

DESCRIPTION

Metasediments including metagraywacke, carbonate iron formation, biotite quartz feldspar gneiss (interpreted as felsic-tuff), amphibolite (mafic tuff), granitic gneiss, pegmatite and diabase have been recognized by Texasgulf geologists on the HEK grid.

Regional mapping by Bostock (1976) shows the area to be mainly underlain by lit-par-lit gneiss and biotite schist, some hornblende-biotite gneiss, granitic rocks containing scattered inclusions of the foregoing, augen gneiss, and to the west of the Coppermine River, metasediments of the Itchen Formation. Bostock's map shows the HEK grid to be underlain by upper amphibolite facies rocks, with the sillimanite (or andalusite) - microcline isograd passing diagonally northeasterly through 86 H/1. This is confirmed by King and others (1981).

CURRENT WORK AND RESULTS

Reconnaissance geological mapping at 1:15,840 started in 1977 and continued in 1978. This covered parts of 86 H/1 - NE, SE and SW where airborne EM had detected anomalies. The anomalies were found to be caused by pyrite pyrrhotite and graphite. Some gossans were found to contain copper and zinc.

The HEK grid baseline was extended 960 m south-southwesterly and the 1977 1:2,000 geological mapping, geochemical and geophysical coverage extended over the expanded grid. Trenching of the HEK showing revealed semi-massive sulphides including chalcopyrite and sphalerite, with silver values.

THE YELLOWKNIFE SUPRACRUSTAL BASIN

The Yellowknife Basin, as defined by Padgham, (1981) includes marginal volcanic belts (including the Yellowknife and Beaulieu River-Cameron River volcanic belts) and an extensive area of turbidites deposited distally to the volcanic belts. The basin includes granitoid plutons, the larger ones having a lobate outline. The basin is bordered by Great Slave Lake to the south and gneissic terrain to the north.

The volcanic belts marginal to the basin host gold deposits and silver-base metal deposits. The turbidite sediments that fill most of the basin and the granitic rocks that intrude them host gold, quartz and rare metal pegmatites.

BEAULIEU RIVER - CAMERON RIVER SUPRACRUSTAL BELT

This belt includes volcanics and overlying carbonate sediments. These supracrustals adjoin and are draped around the southern part of a block of plutonic rocks, which are in part basement to and in part intrusive into the rocks of the Yellowknife Supergroup. The belt as here defined excludes the widespread and complexly folded distal turbidites of the Burwash Formation which fill the major part of the Yellowknife Supracrustal basin.

A and B CLAIMS
Worldwide Truck & Equipment Ltd.
1676-128 Street,
Ocean Park, B.C.,
B4A 3V3

Silver, base metals
85 I/10,15
62°44'N, 112°40'W

REFERENCES

Henderson (1976); Gibbins and others (1977); Lambert (1974); Seaton (1978).

PROPERTY

18 A claims; B 1-5

LOCATION

The A claims are at the north end of Turnback Lake roughly 95 km east-northeast of Yellowknife. They extend roughly 3 km westward from the Lake.

The B claims lie about 11 km southwest of the A claims. They are situated mainly on the east bank of the Beaulieu River, 3 km downstream of its emergence from Turnback Lake.

HISTORY

A 1-8 and B 1-5 were recorded in September, 1973; A 15-24 in October, 1974. Previous exploration history is discussed in the 1974 and 1975 Mineral Industry Reports (Gibbins and others, 1977; Seaton, 1978).

DESCRIPTION

The claim area has been described and references given in the 1974 and 1975 Mineral Industry Reports.

The A claims are underlain by granite, pegmatite, quartz-biotite gneiss, schist, hornfels, limestone, skarn and, near a salient of granite, hornblende gneiss. The B claims are underlain by felsic and intermediate volcanics and metasediments.

Silver-base metal showings are associated with amphibole gneiss, calc-silicate rocks and limestone in the Turnback Lake area.

CURRENT WORK AND RESULTS

On the A claims a grid with a 3.94 km long N56°E baseline and with 28.7 km of crosslines 120 m apart was cut and surveyed. The grid covers all of the property except six claims north of Turnback Lake. A magnetometer survey of the grid outlined several linear and locally sinuous northeasterly trending anomalies. A horizontal loop EM survey delineated 11 conductors. The longest of these has a length of 650 m.

A grid was completed on the three northern B claims (B 1, 2, 3) on the east side of the Beaulieu River. The grid consists of 6.96 km of baseline and crosslines. The baseline is 1.08 km long and oriented N30°E. A magnetometer survey of the grid indicated northeasterly magnetic trends in the bedrock. A horizontal loop EM survey delineated two conductors in the northwestern and southwestern parts of the grid.

LITHIUM, TOURMALINE, RARE MATERIALS

YELLOWKNIFE SUPRACRUSTAL BASIN, SEDIMENTS

The extensive tract of turbidite sediments of the Burwash Formation that fill the Yellowknife Basin host numerous vein-type mineral deposits. Auriferous gold veins are common in the turbidites. Tungsten occurs with gold in some quartz veins. Lithium-bearing pegmatites cut the turbidites and more rarely the granitic rocks that intrude the sediments. Beryl, tantalum and tourmaline occur abundantly in some pegmatites but only lithium and tourmaline were exploration targets in 1978.

ELK - 1 CLAIM
Hemisphere Development Corp.,
493, East 29th Street,
North Vancouver, B.C.,
V7N 1E2

Lithium
85 I/1
62°13'N, 112°14'W

REFERENCES

Davidson (1978); Henderson (1976); Jolliffe (1944); Rowe (1952).

PROPERTY

ELK - 1 Claim

LOCATION

The property is on the north shore of the East Arm of Great Slave Lake, 115 km east-southeast of Yellowknife (Fig. VII-1) and roughly 5 km east of the Blachford Lake alkaline intrusive (Davidson, 1978).

HISTORY

The property was first staked in 1943, and mined intermittently from 1946 to 1954 by De Steffany Tantalum-Beryllium Mines Limited and by Boreal Rare Metals Ltd.

The ELK-1 claim was staked in April, 1978. A 50% interest was transferred to Hemisphere Development Corportaion and 50% to Anglo-Celtic Exploration Limited.

DESCRIPTION

The property is mainly underlain by metasediments of the Yellowknife Supergroup which are cut by the northerly striking Moose II pegmatite dyke. Columbite-tantalite with minor tin minerals are found in separate zones from those containing the lithium minerals; spodumene, amblygonite and lithiophyllite.

CURRENT WORK AND RESULTS

An evaluation of the economic potential of the Moose II pegmatite dyke was made and some check samples taken from previous sample locations.

PAINT CLAIM
Hemisphere Development Corp.,
493, East 29th Street,
North Vancouver, B.C.,
V7N 1E2

Lithium
85 I/6
62°24'N, 113°23'W

REFERENCES

Henderson (1976)

PROPERTY

PAINT 1 Claim

LOCATION

The claim is on the northwest shore of Harding Lake roughly 45 km easterly of Yellowknife.

HISTORY

The property was first staked in 1957 by J.R. Woolgar who discovered several lithium bearing dykes in the area.

In April, 1978 C.N. O'Sullivan staked the PAINT-1 claim.

DESCRIPTION

Several spodumene-bearing pegmatite dykes, mostly with northwesterly trends, cut a granodiorite pluton near its contact with Yellowknife Supergroup metasediments. The contact is exposed about 1 km to the east of the claims on an island in Harding Lake.

CURRENT WORK AND RESULTS

The PAINT-1 claim was examined by a consultant and an evaluation made on behalf of Hemisphere Development Corporation.

GIL-1 CLAIM	Tungsten, (gold)
Hemisphere Development Corp.,	85 I/7
493, East 29th Street,	$62^{o}29'$N, $112^{o}57'$W
North Vancouver, B.C.	

REFERENCES

Henderson (1976); Little (1959); Lord (1951).

PROPERTY

GIL-1 Claim.

LOCATION

The claim is roughly 70 km east-northeasterly of Yellowknife, on the west shore of Gilmour Lake and 2 km southeast of Consolation Lake.

HISTORY

Gold was discovered in the claim area in 1940 by A. Mitchell, who staked the ground as the DOT 1-6 and the EVA 1 and 2 claims. Scheelite was found on the DOT 5 claim in 1940, and on the adjoining LUCKY claims to the west (Lord, 1951). The showings were trenched in 1941 and additional scheelite-bearing veins found on the property. About 30 tons of vein material grading 2.18% WO_3 were stockpiled.

DESCRIPTION

The claims are underlain by Yellowknife Supergroup metasediments, which are tightly folded and locally overturned to the west and southwest. The central part of the claim is occupied by the north-northwesterly trending axial zone of a steeply plunging asymmetric fold which faces southwards. This axial zone is followed by several scheelite bearing quartz and quartz-carbonate veins. Other veins are subparallel to the axial zone veins and conformable with the northwesterly-striking limb of the fold.

CURRENT WORK AND RESULTS

Two and a half days were spent mainly in making detailed observations on vein structure and mineralogy. A total of 10 samples taken from seven veins assayed from 0.01% to 2.08% WO_3. The highest gold assay was 1,540 ppb.

An evaluation of the economic potential of the property incorporating recommendations for future work was made by a consultant.

THOR CLAIMS	Lithium
Canadian Superior Exploration	85 I/8
Limited,	$62^{o}25'$N, $112^{o}10'$W
P.O. Box 10104 Pacific Centre	
1800, 701 W. Georgia Street,	
Vancouver, B.C.	
V7Y 1C6	

REFERENCES

Henderson (1976); Lasmanis (1978); Seaton (1978).

PROPERTY

THOR 1-14

LOCATION

The claims are roughly 110 km easterly of Yellowknife at Tanco lake, a southeasterly arm of which extends through the southern part of the claims.

HISTORY

The THOR claims cover ground staked as the ECHO group in 1955, and optioned by North American Lithium Company Limited. Surface sampling, mapping and diamond drilling resulted in an estimate of 2,000,000 tons grading 1.50% Li_2O mineablefrom pegmatite dykes by open pit.

In 1958 the property was acquired by Down North Minerals Limited. Two x-ray holes tested the Central Dyke and metallurgical testing was done on a one ton sample (Seaton, 1978).

Canadian Superior Exploration staked the claims and sampled the spodumene-bearing Echo-Tanco pegmatite near Echo Lake in the northern part of the claims. An estimate of 9,205,000 tons grading 1.50% Li_2O to a depth of 152 m was made from these surveys.

DESCRIPTION

The Thor pegmatites are an anastomosing system of lithium-bearing pegmatites with a general northwesterly trend, though locally having widely divergent orientations. The dykes are enclosed in hornfels and quartz-biotite schists of the Burwash Formation. From northeast to southwest the main dykes are: The East and East Number 2 dykes, the East Number 1 dyke, the east-northeasterly trending Central Dyke, the Central Number 3 and West End Central Dyke, the Central Numbers 1 and 2 dykes, and the Sidehill Dyke. The dykes diverge to the northwest.

CURRENT WORK AND RESULTS

Six diamond drill holes, totalling 381 m, tested the Thor pegmatites. Five holes tested the steeply northeasterly dipping Central Dyke, and one hole tested the East Dyke which has a steeply southwesterly dip. Generally, Li_2O grades and thicknesses of lithium-bearing pegmatite encountered at depth were similar to those indicated by surface sampling, assays and estimates of spodumene content in outcrop.

KI CLAIMS	Lithium
Canadian Superior	85 I/11
Exploration Limited,	$62^{o}56'$N, $113^{o}29'$W
P.O. Box 10104, Pacific Centre	
1800, 701 W. Georgia Street,	
Vancouver, B.C.	
V7Y 1C6	

REFERENCES

Henderson (1976); Lasmanis (1978); Seaton (1978).

PROPERTY

KI 1-5.

LOCATION

The claims are roughly 50 km northeasterly of Yellowknife and 2.5 km south of Thompson Lake.

HISTORY

The KI claims were staked in 1975 and explored by mapping and sampling (Lasmanis, 1978; Seaton, 1978).

DESCRIPTION

Much of the northern part of the property is occupied by a small lake.

A spodumene-bearing pegmatite up to 17 m wide and sub-parallel to the local bedding extends southeasterly from the lake through claims KI 2 and KI 4. Near the lake, on claim KI 2, the dyke splits into a number of apophyses of pegmatite and aplite. Bedding of the enclosing schists and hornfels dips steeply to the southwest.

The KI claims pegmatite was estimated to contain 2,812,000 tons to a depth of 152 m, grading 1.40% Li_2O.

Cordierite-bearing schists of the Burwash Formation underlie much of the property. They have steep and variable dips, and are locally overturned to the west. The north-north westerly trending cordierite isograd passed roughly 4 km east of the claims (Henderson, 1976).

CURRENT WORK AND RESULTS

Three diamond drill holes totalling 235 m explored the pegmatite on the KI 2 and KI 4 claims. Two of the holes were near the KI 2 and the KI 4 boundary and the third 110 m to the northwest.

Drill intersections indicated that the pegmatite has a steep dip to the southwest, close to that of the enclosing rocks, and maintains a grade (1%-2% Li_2O) and thickness comparable to those estimated from surface surveys. Pegmatite was not intersected at its projected down dip position in the vertical hole.

LU CLAIMS — Lithum — 85 I/11 — 62°33'N, 113°26'W

Canadian Superior Exploration Limited,
P.O. Box 10104, Pacific Centre
1800, 701 W. Georgia St.,
Vancouver, B.C. V7Y 1C6

REFERENCES

Henderson (1976); Lasmanis (1978); Seaton (1978).

PROPERTY

5 LU claims

LOCATION

The claims are 5.5 km east of Hidden Lake and 48 km east-northeasterly of Yellowknife.

HISTORY

The property, first staked in 1958, was later covered by the BILL, JIM and LIT claims. Exploration included the drilling of one 92 m hole.

Canadian Superior recorded the LU claims in 1975 and explored the lithium-bearing pegmatites by mapping and sampling (Lasmanis, 1978; Seaton, 1981).

DESCRIPTION

Northeasterly-striking pegmatites cut steeply dipping metasediments of the Yellowknife Supergroup, which strike north-northeasterly and are overturned to the west.

The claims describe an inverted L with the limbs to the east and south. Pegmatite dykes outcrop on claim LU 10 at the south end of the southern limb, on claim LU 8 (where the two limbs of the L join) and to the east on Lu 3 and 5.

Schists of the Burwash Formation underlying the claims contain cordierite; the cordierite isograd trends northerly roughly 2 km east of the claims (Henderson, 1976).

CURRENT WORK AND RESULTS

Five trenches excavated on the D6 pegmatite on claim LU 3 in 1978 were sampled and the samples assayed for lithium. In addition visual estimates of spodumene content were made.

Mapping and sampling of trenches excavated prior to 1978 were completed on the D12 pegmatite on claim LU 10.

The LU pegmatites were found to have a good grade (around 1.25% Li_2O) but only moderate tonnage and continuity compared with some other pegmatites in the area (Lasmanis, 1978).

BERYL No. 1 CLAIM — Tourmaline — 85 I/12 — 62°39'N, 113°56'W

Triangular Reflexions Ltd.,
(Triflex)
c/o 303-1306 Haro Street,
Vancouver, B.C.

REFERENCES

Henderson (1976); Jolliffe (1944); Kretz (1968).

PROPERTY

BERYL 1

LOCATION

The property is roughly 30 km northeasterly of Yellowknife and 6 km due north of Prelude Lake.

HISTORY

The claim was recorded by Gabriel K. Garbis in June, 1978. The showing has been known since the nineteen forties (Jolliffe, 1944).

DESCRIPTION

The claim is mainly underlain by Burwash Formation metasediments and is roughly 3 km southwest of an adamellite pluton. The adamellite is strongly discordant to the supracrustal rocks. Two small satellite bodies of adamellite outcrop from 1 km to 3 km to the southeast of the BERYL 1 claim. Numerous pegmatites, locally containing lithium and beryllium minerals are associated with the adamellite (Henderson, 1976). Pegmatites in the Yellowknife-Beaulieu region are discussed by Kretz (1968).

The Beryl No. 1 pegmatite lies in the axial plane of a steeply plunging fold.

CURRENT WORK AND RESULTS

The pegmatite was examined to determine its potential as a producer of indicolite (blue-green lithium-aluminium tourmaline).

The pegmatite was reported to be composed of quartz, grey plagioclase feldspar, muscovite, black tourmaline, indicolite, beryl, minor lepidolite and possible tremolite. The indicolite content was estimated as generally about 1% and locally as much as 5%.

VO CLAIMS
Canadian Superior
Exploration Ltd.,
P.O. Box 10104, Pacific Centre
1800, 701 W. Georgia Street,
Vancouver, B.C.,
V7Y 1C6

Lithium
85 I/13
$62^{o}50'N$, $113^{o}34'W$

REFERENCES

Henderson (1976); Lasmanis (1978); Seaton (1978).

PROPERTY

VO 1-9

LOCATION

The claims are 59 km northeasterly of Yellowknife, and 5 km north of Blaisdell Lake.

HISTORY

The property was previously explored as the 21 claim COTA group, which in 1955 was optioned by General Lithium Corporation Limited from F.D. Nasso. Two diamond drill holes, totalling 377 m, and trenching tested a spodumene-bearing pegmatite. One hole is reported to have intersected pegmatite with good spodumene content across 12.25 m. The other hole cut separate 10.5 and 0.3 m spodumene-bearing sections. Canadian Superior staked the VO claims and mapped and sampled a pegmatite on claim VO 2 in 1975.

DESCRIPTION

The claims are mainly underlain by metasediments of the Burwash Formation, which on claim VO 2, in the southwestern part of the property, are cut by an east-northeasterly trending pegmatitic dyke;the VO No. 5 Dyke. An intrusive adamellite pluton is exposed roughly 2 km west of the claims. Cordierite bearing metasediments underlying the claims are about 8 km west of the north-northwesterly trending cordierite isograd (Henderson, 1976).

In 1975 from surface sampling, Canadian Superior estimated the VO property to contain 3,370,500 tons grading 1.45% Li_2O (Lasmanis, 1978). Reserve potential has since been downgraded following drilling.

CURRENT WORK AND RESULTS

Two drill holes 122 m apart tested the VO No. 5 pegmatite dyke. The holes which cut the dyke at roughly 46 m and 61 m below surface revealed lower grades of Li_2O across shorter intersections than found at surface.

NITE CLAIMS
Canadian Superior
Exploration Ltd.,
P.O. Box 10104, Pacific Centre
1800, 701 W. Georgia Street,
Vancouver, B.C. V7Y 1C6

Lithium
85 J/9
$62^{o}32'N$, $114^{o}48'W$

REFERENCES

Henderson (1976); Lasmanis (1978); Seaton (1978).

PROPERTY

NITE 1-7

LOCATION

The claims are 14 km northeasterly of Yellowknife, 2 km south of Prosperous Lake, and 1 km south of the Ingraham Trail, the road from Yellowknife to Tibbitt Lake.

HISTORY

The ground was previously staked as the 28 claim LI group, which was acquired in 1955 by Nor'Anium Minerals Limited. Trenching by Affiliated Lithium Mines Limited explored two of the lithium-bearing pegmatite dykes (Nos. 1 and 15) in 1956.

Canadian Superior staked, prospected and mapped the NITE claims in 1975 and estimated them to contain 2,580,500 tons grading 1.51% Li_2O to 152m depth (Lasmanis, 1978).

DESCRIPTION

The claims are mainly underlain by complexly folded matasediments of the Burwash Formation. The Prosperous Lake pluton, an adamellite with markedly discordant contacts with the Burwash Formation and abundant associated pegmatite (locally lithium and beryllium bearing) outcrops 2 km northeast of the property. The metasediments lie on the higher grade side of the cordierite isograd (Henderson, 1976).

The NITE pegmatites which strike $N35^{o}E$ through claims NITE 1, 5 and 6 in the northeastern part of the claim block consist of numerous component dykes. Aplitic borders and thin flanking dykes commonly have a lower spodumene content than the main pegmatite dykes. For example, 37 m from the boundary between NITE 1 and NITE 6 claims, Canadian Superior mapped a 9 m wide pegmatite which assayed approximately 1.4%Li_2O and was estimated to contain 30% spodumene. A subparallel 3 m wide dyke of aplite, separated from the main pegmatite dyke by 9 m of hornfels was estimated to contain only 10% - 20% spodumene, though no sample was taken for assay. Roughly 70 m north of the boundary between claims NITE 5 and NITE 6 the NITE pegmatite locally consists of up to five component bodies arranged parallel or *en echelon*. These pegmatites and related aplites have an aggregate thickness (including hornfels partings) of 55 m. The estimated spodumene content is greatest in the thicker pegmatite bodies.

CURRENT WORK AND RESULTS

A hole was collared roughly 30 m north of the boundary between the NITE 5 and NITE 6 claims. The 74 m-long hole cut a 9 m section averaging 1.83% Li_2O. The pegmatite dips steeply to the southeast as do the enclosing biotite schists.

GOLD

AS CLAIMS
V.F. Erickson Consultants
Limited,
c/o Barren Lands Exploration
Services Ltd.,
P.O. Box 1915,
Yellwoknife, N.W.T.
XOE 1HO

Gold
85 I/7
$62^{o}24'N$, $112^{o}45'W$

REFERENCES

Henderson (1976).

PROPERTY

AS 1-4

LOCATION

The claims are 85 km easterly of Yellowknife on the north shore of Hillcoat Lake.

HISTORY

Claims AS 1-4 were staked in 1969 by A.A. Scott, and subsequently trenched and prospected.

DESCRIPTION

A quartz vein on claim AS 3 is enclosed in Burwash Formation sediments (greywacke and minor phyllite) which strike west-northwesterly and dip steeply to the north-northeast. They are less than 2 km from, and on the low grade side of, the cordierite isograd.

CURRENT WORK AND RESULTS

The claims were geologically mapped at 1:2,400, and a trench in the northeastern part of the property sampled. The main trench is 58 m long and exposes a quartz vein with phyllite walls. Both the quartz vein and the walls locally contain pyrite, arsenopyrite, malachite, sphalerite and galena. The vein strikes west.

Only one of 50 samples from the main vein was gold-bearing. Twenty other samples from quartz veins and sulphide mineralized zones elsewhere on the property were devoid of gold. The 1978 work was done by Barren Lands Exploration Services Limited of Yellowknife for V.F. Erickson Consultants Limited.

YELLOWKNIFE VOLCANIC BELT

The Yellowknife Volcanic Belt extends for 35 kms from Great Slave Lake northerly along the western border of the Yellowknife Supracrustal basin. It is composed predominantly of basaltic flows of the Kam Formation which host the rich gold deposits at Yellowknife.

YT CLAIMS	Gold
Giant Yellowknife Mines Ltd.,	85 J/8
Precambrian Building,	62°22'N, 114°24'W
Yellowknife, N.W.T.,	
XOE 1HO	

REFERENCES

Helmstaedt and others (1979); Henderson (1976); Henderson and Brown (1966); Jolliffe (1942); Seaton (1978); Seaton and Hurdle (1978).

PROPERTY

YT 1-72.

LOCATION

The property is on the west side of Yellowknife Bay, mainly on nearshore islands and roughly 16 km south of Yellowknife.

HISTORY

YT 1-72 were staked in 1973 for the Nugget Syndicate. Subsequent exploration by Geophysical Engineering included geological mapping and geophysics (Seaton, 1978; Seaton and Hurdle, 1978).

DESCRIPTION

The claims are underlain by mafic and felsic (dacitic) volcanics of the Kam Formation and numerous topographically prominent gabbro sills. Thin cherty tuffaceous beds are also present. In the extreme east of the claims conglomerates and sandstones of the Jackson Lake Formation form small islands (Helmstaedt and others, 1979; Henderson and Brown, 1966).

CURRENT WORK AND RESULTS

Three diamond drill holes, totalling 435 m, were completed for Giant Yellowknife Mines Ltd. Maps by Jolliffe (1942) and by Helmstaedt and others (1979) only cover part of the YT claims and not the area drilled.

Two of the holes were drilled to test the projected position of the Campbell Shear Zone. These holes were inclined southeasterly from separate islands roughly 300 m apart. The third hole was on claim YT 30 and 1.1 km north-northeasterly of the first two holes.

The two more southerly holes on claim YT 41 and YT 49 intersected mafic volcanic lava flows and fragmentals, gabbro, and sediments including graphitic slate interbedded with quartz pebble conglomerate. The highest gold assay in these holes was 0.03 oz per ton across 0.3 m.

The third hole intersected abundant gabbro, and mafic and intermediate volcanics. The best gold assay was 0.02 oz per ton across 0.3 m.

ANN CLAIMS	Gold
D. Nickerson,	85 J/9
Yellowknife,N.W.T.	62°23'N, 114°23'W

REFERENCES

Henderson and Brown (1966).

PROPERTY

ANN 1-9

LOCATION

The property, centred roughly 13 km north of Yellowknife, extends nearly 3 km south from Ryan Lake and, except at the northern and southern ends, is one claim wide. The southwest corner of the property is 0.6 km east of Landing Lake.

HISTORY

D. Nickerson recorded ANN 1-10 in March, 1971. Claims ANN 7-9 lapsed, but were restaked in 1973.

Work on the claims has included a geochemical survey and trenching.

DESCRIPTION

The claims cover part of the Yellowknife greenstone belt. Pillowed and massive volcanics of the Kam Formation underlie most of the property. Locally in the southern part of the claim group the pillow lavas are variolitic. Several units of flow breccia and a thin unit of cherty tuff cross the property. Strike of the Kam Formation rocks is northeasterly and dips are steep to vertical. Tops of the pillow lavas are to the southwest.

Early metagabbro sills and intrusions are cut by northeasterly trending metagabbro and metadiorite dykes, which in turn are cut by later northwesterly trending diabase and gabbro dykes.

CURRENT WORK AND RESULTS

A narrow quartz vein in a 1.5 m or narrower northeasterly striking shear zone on ANN 9 in the southern part of the property was tested by pitting and sampling. Nine pits were excavated along a 140 m section. Erratic, but locally high gold values were obtained from a vein width of less than 5 inches.

The shear zone was mapped, as was a thin

parallel shear zone roughly 12 m to the northwest.

INDIN LAKE SUPRACRUSTAL BELT

This is a sinuous belt of metavolcanics and metasediments, near the western margin of the Slave Province. Indin Lake is roughly 40 km north of the southern end of the belt.

KEP CLAIMS
Paulson & Associeates
820 Parkside Place,
602-12 Avenue S.W.,
Calgary, Alberta,
T2R 0H5

Gold
86 B/6
64°17'N, 115°13'W

REFERENCES

Lord (1941, 1942, 1951); Stanton and others (1948, 1954); Tremblay and others (1953).

PROPERTY

KEP -1 and -2 claims.

LOCATION

The property is roughly 210 km northwesterly of Yellowknife on Leta Arm, of Indin Lake.

HISTORY

The Indin Lake area has been explored intermittently for gold since the nineteen thirties (Lord, 1941, 1942, 1951). The KEP claims cover ground staked in 1944 as the LETA claims. KEP-1 and-2 were recorded in February, 1978.

DESCRIPTION

The claims cover part of a northerly trending volcanic belt, which is locally nearly 1 km wide and is flanked by metasediments of the Yellowknife Supergroup (Stanton and others, 1948, 1954; Tremblay and others, 1953). A gold-bearing zone, drilled in 1946, lies under Leta Arm near the boundary of the KEP-1 claim. It has been estimated to contain 29,000 tons grading 0.354 oz/ton Au. The zone is approximately 300 m north of the Diversified Mining Interests (Canada) Ltd. shaft.

Three other mineralized zones have been trenched on the KEP-1 claim. One is on the east shore, one on the west shore and one at the north end of Leta Arm.

CURRENT WORK AND RESULTS

A report prepared by a consultant reviewed past work and the economic potential of the claims was evaluated.

NAHANNI REGION

C. Lord
D.I.A.N.D., Geology Office, Yellowknife.

The Nahanni Region extends from Inuvik south to Fort Simpson and from the mountains just east of the Mackenzie River to the Yukon border.

Exploration slowly declined in this region from 1972-77, but has held steady since then. High inflation rates, economic recession, low metal prices and a general shift to uranium exploration, a commodity apparently absent from this region, are the main reasons for this decline.

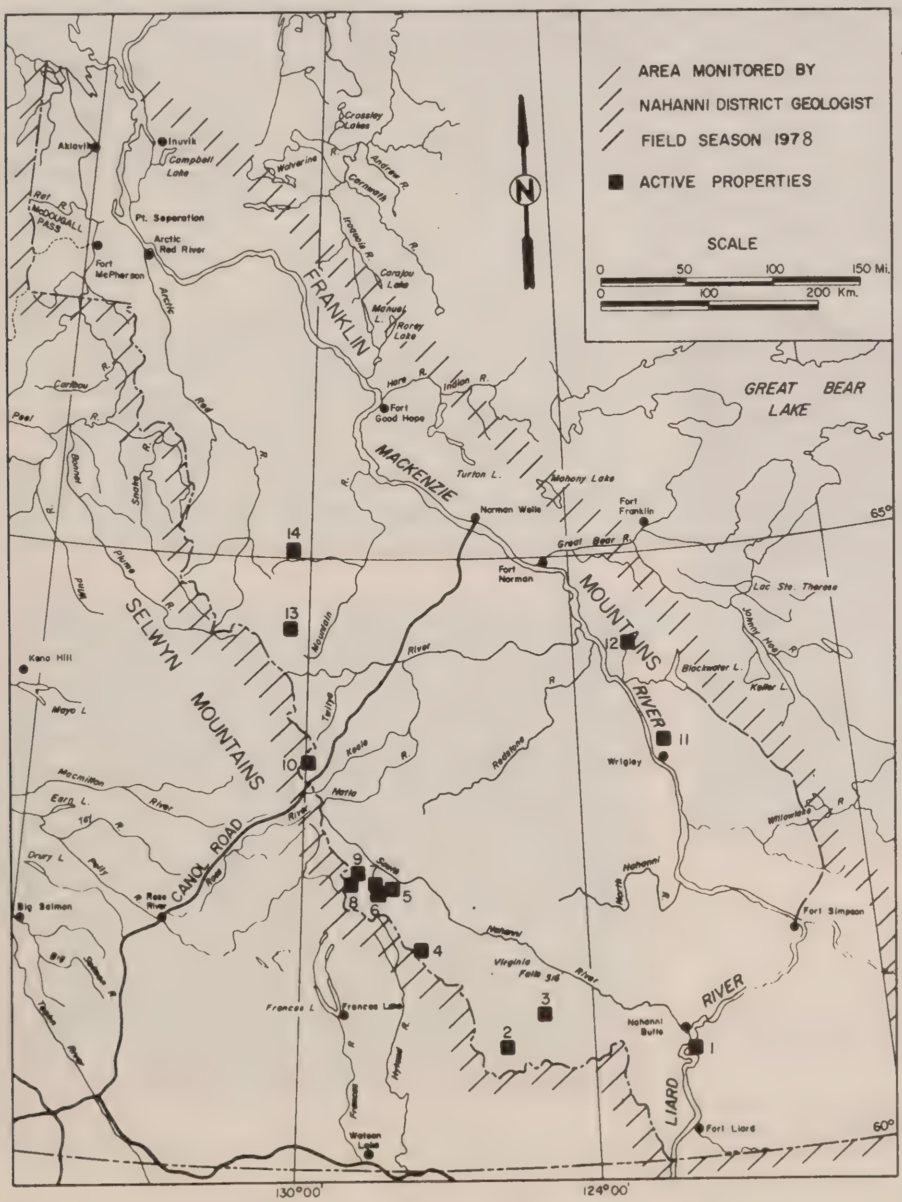
Nevertheless, Rio Canex continued to search for zinc-lead in Helikian carbonates at Gayna River, Canex Placer did further tests at Howard's Pass and Amax prepared the deposit at Mactung for production, possibly in 1984.

Exploration for tungsten increased in 1978 mainly due to high metal prices and dwindling reserves of that commodity in the United States. Union Carbide explored the Lened property and the adjoining CAC claims were prospected by Amax. Canada Tungsten continued to test the Baker Prospect.

Regional prospecting and evaluation programs were done by Welcome North, St. Joseph Exploration, Canico, Getty Oil and Hudson Bay Mining and Smelting, mainly in the Besa and Road River shales.

Giant Yellowknife Mines prospected carbonates of the Mt. Kindle and Franklin Formation northeast of Wrigley, whilst Diapros did regional geochemical surveys looking for diamond-bearing diatremes in the Interior Plains (Fig. VIII-1).

Exploration ranged from prospecting to the fully integrated use of geochemistry, geophysics, detailed geological mapping and diamond drilling.



1. E. Linberg
2. CAST - St. Joe's Exploration
3. Permit - Nahanni Placer
4. Baker Prospect - Canada Tungsten
5. Vulcan - Rio Canex
6. CAC - Amax
7. Lened - Union Carbide
8. Howard's Pass - Canex - Placer
9. CMC - Cominco
10. Mactung - Amax
11. Giant Yellowknife Mines
12. Permits - Diapros
13. Permits - Canico
14. RT - Rio Canex

FIGURE VIII-1: Area monitored by Nahanni District Geologist in 1979.

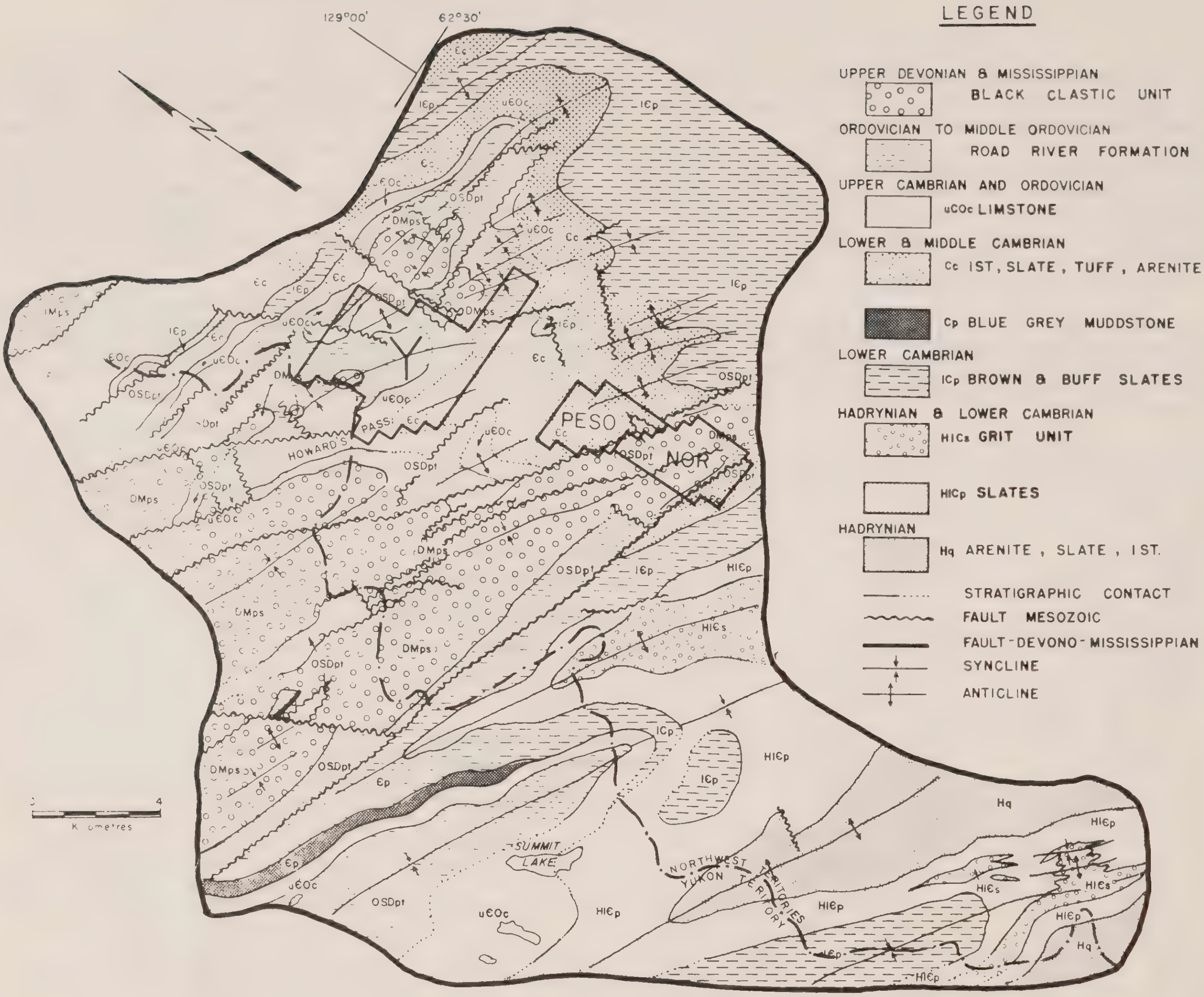


FIGURE VIII-2: Geology of Howard's Pass after Gordey (1978).

In the following descriptions, properties in the Mackenzie Mountains are listed by metal commodity and geological environment. They are divided into;

Stratiform lead-zinc in shales.
Carbonate hosted zinc-lead.
Tungsten associated with skarns.
Precious metals.

STRATIFORM LEAD ZINC IN SHALES

SELWYN BASIN

Virtually all exploration in the Road River shales of the Selwyn Basin was done by Canex Placer on their deposits at Howard's Pass.

Regional prospecting and evaluation of the Road River and Besa River Shales was done by Canico, Welcome North, Getty Oil and Hudson Bay Mining and Smelting (Fig. VIII-1).

Sediments of the Selwyn Basin or trough (Blusson, 1976) consist of carbonaceous calcarenite, shaly limestone and minor argillaceous calcarenite and grey, green and black ribboned chert and variegated shale of presumably deep water origin. The geology of the area around Howard's Pass was mapped in 1977 by S.P. Gordey (1978). (Fig. VIII-2).

Canex Placer's deposit at Howard's Pass is in black shale-mudstones of the Road River shale about 60 m above the contact with Cambro-Ordovician 'wavy-banded' limestone. The shale-mudstone occupies relatively shallow spoon shaped sub-basins developed on the platform to basin slope. A syngenetic to early diagenetic origin is postulated for these deposits.

The lead zinc deposits in the Swim-Vangorda belt on the western side of the Selwyn Basin are in

rocks of similar lithology that are probably of the same age (i.e. Orodovician-Silurian) and depositional environment.

The 'Black Clastic Unit', which unconformably overlies the Road River Formation, consists predominantly of slate and minor clastic interbeds in the lower units. Coarse clastics predominate in the upper units.

The lower slate and shale units contain a barite horizon which in several areas hosts stratiform lead-zinc deposits. No mineral occurrences have been found in the Upper Clastic Units.

The barite horizon is widespread and almost always at the same stratigraphic position. The barite content varies from thin lamellae in several meters of black shale to massive bedded deposits 2 to 13 m thick. Lead and zinc are usually found associated with the barite. Thickness and metal content probably reflects local structural, sedimentary and possibly volcanic controls.

The major deposits, TOM and JASON, have similarities to the Devonian Meggan deposit in Germany. The Meggan model was used by exploration companies looking for similar deposits between MacMillan Pass and Tungsten.

Y CLAIMS — Lead, Zinc
Placer Development Ltd., — 105 I/6
700, 1030 West Georgia St., — 68°28'N, 129°10'W

REFERENCES

Gordey (1978, 1979); Green and others (1968); Lord (1982).

PROPERTY

Y 6-24, 27-30, 35-50, 60, 62-79, 88-113 and 112-162.

LOCATION

The 125 Y claims straddle the N.W.T.-Yukon border 201 km north of Watson Lake. A 64 km winter road built in 1972-73 from near the end of the Tungsten Highway to Howard's Pass was passable only by tracked vehicles, but was replaced in 1977 by an all weather road.

FIGURE VIII-3: Howard's Pass - XY deposit

HISTORY

The Y claims were staked during the summer of 1972 to cover a large geochemical anomaly found by Placer's regional exploration. In April, 1975, U.S. Steel began to contribute exploration funds with Placer continuing as manager.

DESCRIPTION

Howard's Pass lies within the Selwyn Mountains which are carved from a sequence of northwesterly-striking Proterozoic and Paleozoic sediments intruded by Cretaceous quartz monzonite and granitic stocks. The sediments have been folded about northwesterly trending axes into a series of anticlines and synclines, cut by northwesterly and northeasterly striking thrust faults.

The main mineralized zone is on the south-westerly facing slope of a rounded, northwesterly-trending overburden-covered ridge. Trenches bulldozed across the face of the hill have exposed deeply-weathered black graptolitic 'shale'. Such trench exposures are not reliable sources of structural information because of the varying effects of soil creep and solifluction on the hillside. As a result of deep weathering, the mineralized areas are marked only by a faint rusty gossan or locally by small amounts of secondary minerals such as hydrozincite or smithsonite-cerussite.

The host rock, a black graphitic , pyritic shale is now considered to be a mudstone by company geologists. Calcareous lenses of black, coarsely recrystallized limestone within the mudstone are a few feet thick and probably less than 100 feet long. The

FIGURE VIII-4: Indicator moss - has a limited use in identifying zinc rich areas.

mudstone also contains calcareous pyritic nodules as large as golf balls. Beneath the host rock lie thin wisps or layers of mudstone less than 5 cm thick. Apparently the mineralized area lies in Road River shale which, together with the underlying banded limestone, form part of the southwest limb of a syncline. The host rock strikes to the northwest and was thought to dip steeply to the northeast, but detailed work indicates that the structure is much more complex.

CURRENT WORK AND RESULTS

Detailed mapping, stratigraphic studies and diamond drilling were done on the deposits in preparation for underground development in 1980. Most of the drilling was concentrated on the ANN claims.

CMC, Z CLAIMS — Lead, zinc
Cominco Ltd., — 105 I/6
200, Granville St., — 62°28'N, 129°05'W
Vancouver, B.C.

REFERENCES

Gordey (1978, 1979); Green and others (1968);

PROPERTY

10 CMC claims, 35 Z claims.

LOCATION

The CMC and Z claims tie onto Canex Placer's XY property (Fig. VIII-2).

HISTORY

The CMC claims were staked in 1972, the Z claims in 1977.

DESCRIPTION

The claims are predominantly underlain by Road River and Besa River Shales.

CURRENT WORK AND RESULTS

A Max-Min geophysical survey in horizontal loop configuration was done over the Road River Formation.

The survey was successful in mapping the stratigraphy.

PERMITS 524-528 — Lead, zinc
Canadian Nickel Company, — 106 B/1,2
Whitehorse, Yukon — 64°07'N, 130°30'W

REFERENCES

Blusson, (1974); Cecile, (1978).

PROPERTY

Permits 524-528.

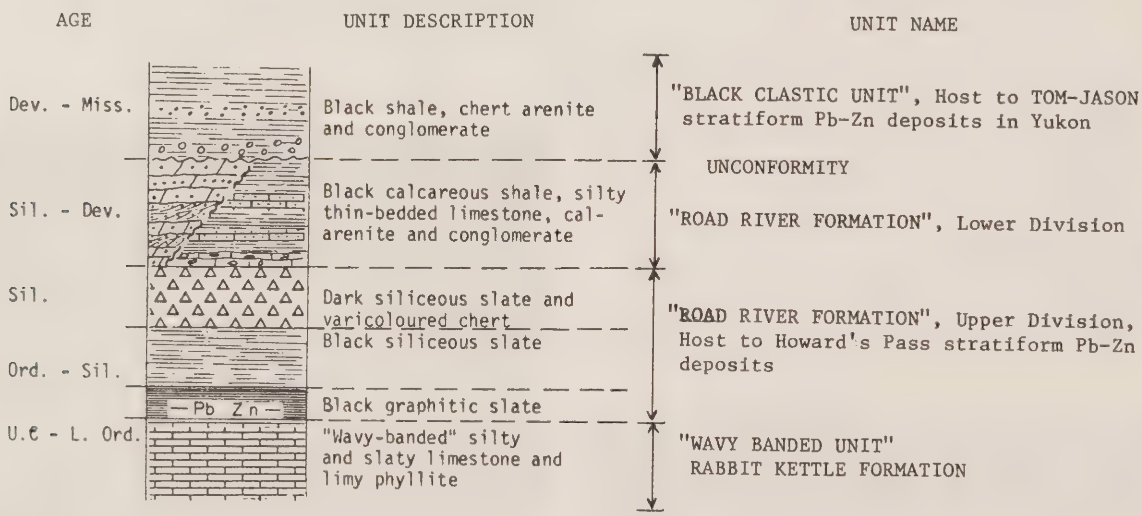


FIGURE VIII-5: Generalised stratigraphic column - Howard's Pass area.

LOCATION

The permits are approximately 100 km north-northwest of MacMillan Pass. Ross River, Yukon, is 250 km to the south-southwest. Misty Lake, Yukon is suitable for fixed-wing aircraft.

HISTORY

The permits were acquired on January 1st, 1978.

DESCRIPTION

The permits lie on the eastern edge of the Selwyn Basin where carbonates of the Mackenzie Platform change laterally westward into a fine grained black clastic sequence (Road River shales) representing basinal deposits . Deposition in this basin began in the Cambrian and ended in the Devonian. Minor volcanics are contemporaneous with Road River deposits .

Overlying the Road River Formation are fine grained clastics and chert pebble conglomerates of the Besa River Black Clastic formation (Fig. VIII-7). The source of these clastics is to the west and southwest, whereas all prior sediments were derived from the east.

During Road River times the facies boundary between the basinal shales and platform carbonates migrated widely across the Mackenzie Platform. In the permit areas the clastics were deposited in the Misty Creek Embayment (Cecile, 1978).

FIGURE VIII-6: Diatreme intruding Road River Shales

AGE	GSC MAP UNIT**	LITHOLOGY
CARBONIFEROUS	Mattson Fm.	Argillite; grey, green and brown, dark, thick to medium bedded, locally containing limestone and barite nodules; also siltstone and chert interbeds.
MISSISSIPPIAN		Shale and Mudstone; dark grey, medium bedded, locally limy; also shaly or slaty; quartz siltstone interbeds common locally.
		Quartzite; massive, dark and light grey, structureless, clean, orthoquartzite.
MISSISSIPPIAN	Besa River Fm.	Shale; 1. blue grey weathering, very fissile. 2. dark brown, shattered, graphitic and limonitized, soft; with resistant ribs of argillite.
DEVONIAN		Quartzite; dark grey, very clean, rust spotted orthoquartzite.
		Barite; grey and buff weathering, thinly laminated barite; with calcareous zones.
DEVONIAN TO UPPER ORDOVICIAN	Road River Fm.	Limestone and/or Argillite; black, medium bedded, fine grained limestone; with variable content of argillite and cherty argillite interbeds; also mudstone, with large limestone nodules.
MIDDLE ORDOVICIAN	Sunblood Formation	Limestone; light grey and cream coloured, cryptograined and fine grained, limestone and dolomite, fossiliferous.

FIGURE VIII-7: Stratigraphic column - Canico's Permit areas.

The Road River Formation occupies the western portion of the permits and is generally poorly exposed and recessive. Lithologies present are shale, siltstone, chert, limestone, sandstone, conglomerate and pyroclastic breccia-conglomerate.

The Besa River and Imperial Formations occupy the eastern portion of the permits and consist of shale, siltstone, minor limestone , chert and barite.

CURRENT WORK AND RESULTS

The permits were mapped and prospected. Stream sediment, soil and rock chip geochemical surveys tested the Road River and Besa River Formations. A brecciated diatreme was found in the Road River Formation. This was sampled to see if it had any Kimberlitic affinities (Fig. VIII-6).

SOUTH NAHANNI AREA

The Road River and Besa River Formations can be traced south of Howard's Pass through the South Nahanni country and into north-eastern British Columbia where they are found in the Kechika Trough. These clastic units have been explored by several companies prior to 1978 but only recently has the stratigraphy been well enough understood for the shales to be differentiated and mapped.

Welcome North Mines, St. Joseph Exploration, Getty Oil and Hudson Bay Mining and Smelting did regional surveys, covering areas underlain by Road River and Besa River shales in the Flat River (95 E), Virginia Falls (95 F), Glacier Lakes (95 L) and Nahanni (195 I) (NTS map sheet areas).

New outcrops of Besa River Formation were recognized, particularily in the MacMillan Lake area (95 E). Late in the season Welcome North found massive sulphides on the Vulcan property, just west of the South Nahanni River.

PROSPECTING PERMIT 424 — Lead, zinc
Nahanni Placer & Cambrian Exploration, — 95 F/4
43, Westview Drive, S.W., — 61°13'N, 125°43'W
Calgary, Alberta.

REFERENCES

Gabrielse and others 1973.

PROPERTY

Permit 424.

LOCATION

The permit is 288 km west-southwest of Fort Simpson and 20 km south of Virginia Falls on the South Nahanni River.

HISTORY

In 1975 anomalous amounts of zinc were found in stream sediment samples of the Upper Meilleur and Mary Rivers. The permit was acquired in 1976.

DESCRIPTION

In Ordovician and Silurian times there was transgression and regression across the Mackenzie Platform resulting in a series of connecting and coalescing troughs and shallow basins.

Permit 424 covers part of one of these basins. Shales, siltstones and minor sandstones of Ordo-Silurian age underlie most of the permit. Carbonates of the Sunblood Formation, which are in fault contact with the shales, form the Caribou Range in the western part of the permit. Mary and Meilleur rivers drain the area.

CURRENT WORK AND RESULTS

Anomalous zinc values in stream sediment samples found in 1976 and 1977 were further examined in 1978. Detailed geochemical grids were used to define the anomalies and rock chip samples were taken.

The anomalies are thought to be caused by the concentration of zinc by drainage systems, the zinc being derived from shales which have naturally high background values.

LAST CLAIM — Lead, zinc, barite
St. Joseph Exploration Ltd., — 95 D
970, Laval Crescent, — 60°51'N, 126°41'W
Kamloops, B.C.

REFERENCES

Bostock (1949); Gabrielse and Blusson (1967).

PROPERTY

LAST 1.

LOCATION

LAST 1 is 145 km northeast of Watson Lake.

HISTORY

LAST 1 was staked on August 8th, 1978.

DESCRIPTION

The claim is underlain by a turbidite sequence of mudstone, siltstone and quartzite overlying a barite bed. These rocks belong to the Besa River Formation which overlies the mudstone shales and cherts of the Road River Formation. These formations represent the southeasterly extensions of the Selwyn Basin into the Caribou River area.

CURRENT WORK AND RESULTS

The claim was geologically mapped, soil sampled and prospected. The barite is thick bedded, massive, nodular and grey colored. The true thickness of the barite bed cannot be determined as it is exposed in the core of an anticline where it is complexly folded. Samples from the outcrop contained 93.7% $BaSO_4$.

Silt samples were taken over the claim to locate possible lead and zinc mineralization as it is commonly associated with the barite. Samples were assayed for copper, lead and zinc.

Anomalous amounts of zinc were attributed to hydrozincite in the Road River Formation.

VULCAN, RX CLAIMS — Lead, zinc
Rio-Canex Exploration Ltd., — 105 I/8
520-800 W Pender St., — 62°18'N, 128°10'W
Vancouver, B.C.

REFERENCES

Gabrielse (1973).

PROPERTY

VULCAN 1-6 blocks (220 claims). RX 1-3 blocks (101 claims).

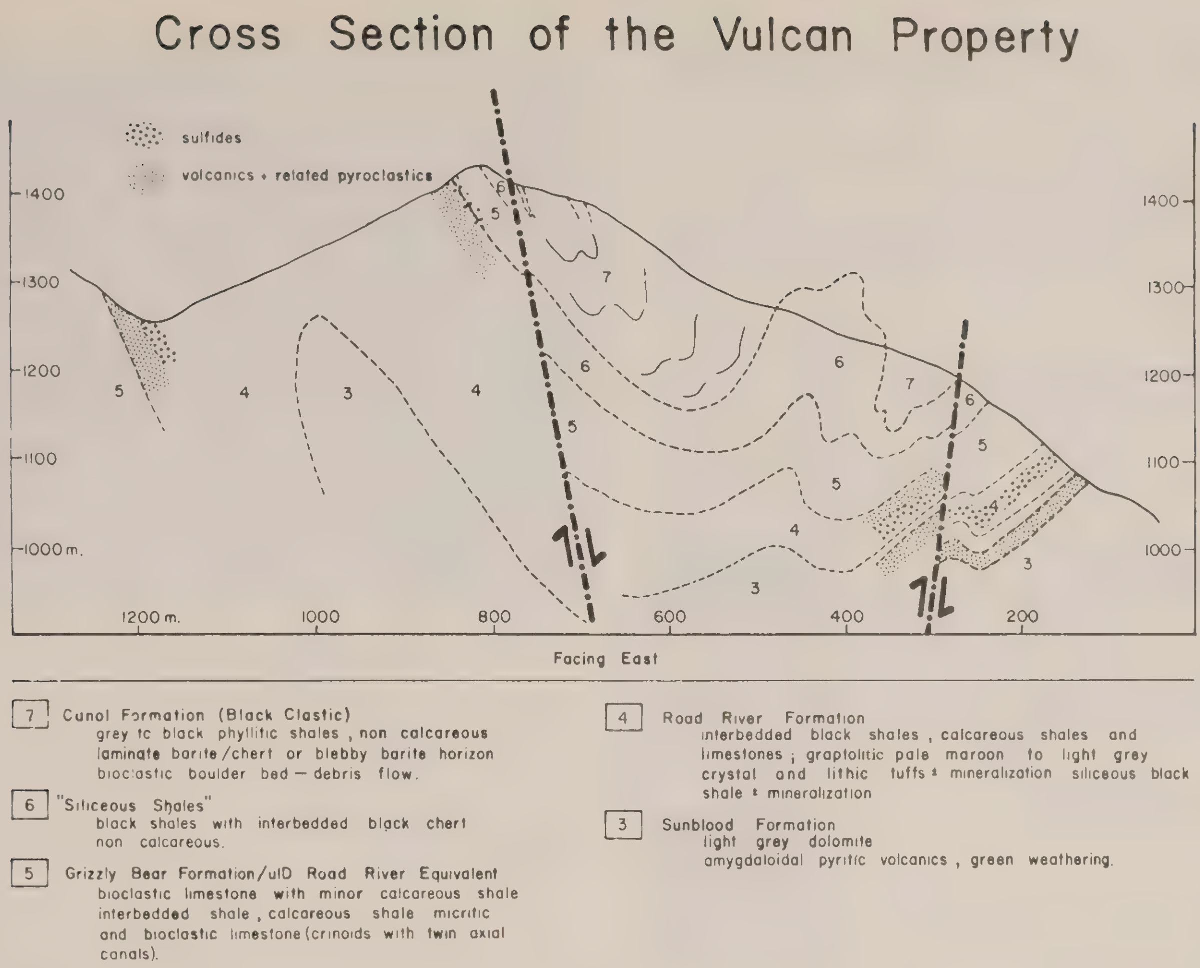


FIGURE VIII-8: Cross section of the Vulcan Property.

FIGURE VIII-9: Barite bed near contact of Sunblood and Road River formations.

FIGURE VIII-10: Sulphide zone near contact of Sunblood and Road River formations.

LOCATION

The claims are approximately 260 km north of Watson Lake, Y.T., and are 50 km from an all-weather gravel road to Tungsten.

HISTORY

In 1974 Cyprus Anvil staked the BARBI claims to cover lead-zinc-silver mineralization found in the northeastern part of the presently existing VULCAN claims. The BARBI claims were examined by mapping, trenching and soil sampling and allowed to lapse.

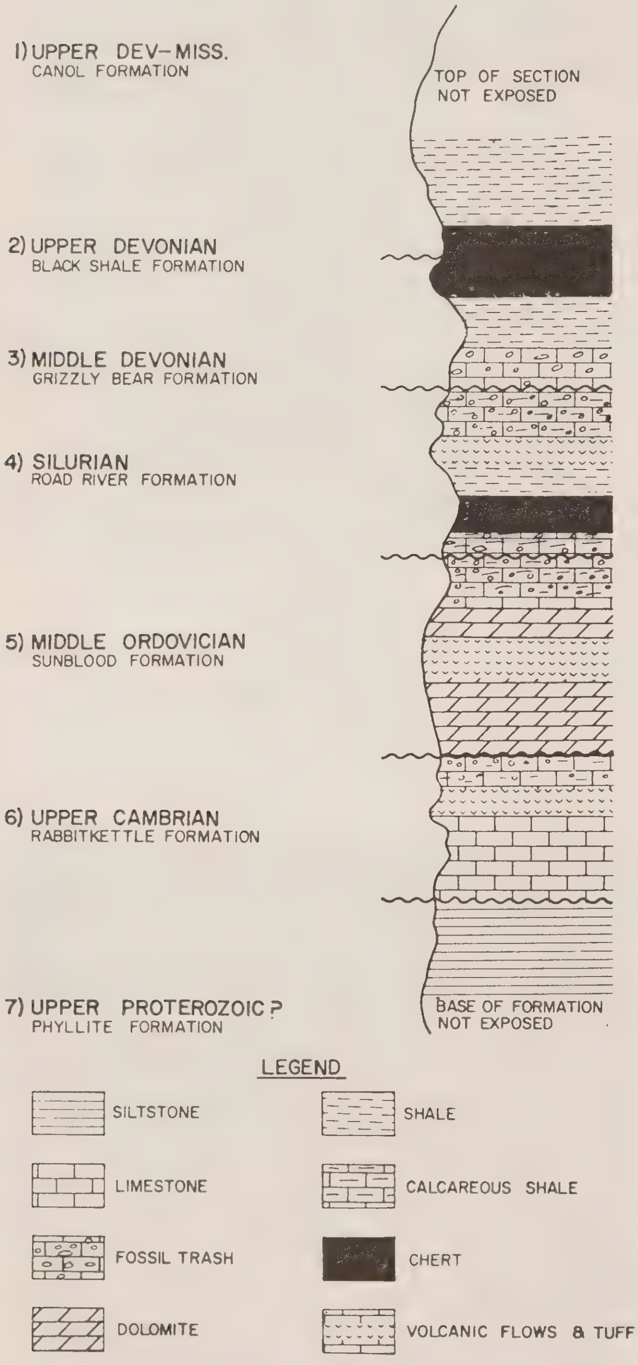


FIGURE VIII-11: Stratigraphic column

- Vulcan property

In 1978 Welcome North Mines Ltd. found a number of significant surface showings and staked 321 claims. These claims, the Vulcan property, were optioned to Rio Canex in 1979.

DESCRIPTION

The property lies on the western limb of the South Nahanni Anticline and comprises rocks that range in age from later Proterozoic to Devono-Mississippian (Fig. VIII-11).

Galena, sphalerite, pyrite, fluorite and barite have been found in over fifty locations straddling the stratigraphic interval from late Cambrian to Middle Devonian. The significant showings occur at or near the Sunblood-Road River contact (Fig. VIII-8), where pyrite, sphalerite and galena are found in chert breccias or inter-laminated with chert and shales of the Road River Formation.

An interesting feature of this property is the association of barite and fluorite with some of the showings and the stratigraphic position of the volcanic rocks (Fig. VIII-11).

CURRENT WORK AND RESULTS

As the mineralization was found late in the season little prospecting or mapping was done.

TUNGSTEN ASSOCIATED WITH SKARNS

Tungsten is found in scheelite (Ca WO_4) bearing skarns developed in limestones at or near the contact with quartz monzonite intrusions. Pyrrhotite and chalcopyrite are commonly associated with scheelite in these pyrometasomatic deposits.

Cretaceous quartz monzonite plutons intrude along a northwesterly zone of weakness or hinge zone that has existed since Cambrian times between the eastern edge of the Selwyn Basin and the platform carbonates. This structurally weak and tectonically disturbed zone has been the locus for many types of mineral deposits including tungsten and lead-zinc in shales in the Howard's Pass and MacMillan Pass areas.

The geology of the area around Tungsten is described by Blusson (1968) as a series of sedimentary rocks of the northern Cordilleran miogeosyncline cut by Mesozoic granitic intrusions. The sedimentary rocks range from late Precambrian to Devonian-Mississippian, and include well sorted sandstones, thick and thin bedded carbonates, fine-grained quartzite, sandstone, dolomite and shale. Middle Cambrian rocks are platy limestone, siltstone and shale, and Upper Ordovician rocks are black, cherty shale.

It is in the Lower Cambrian carbonate, particularly the ore or Swiss-cheese limestone of unit 3a (Blusson, 1967), that the majority of scheelite bearing skarns developed. There appears to be a local stratigraphic control for the skarn distribution, with lithology of the host rock and the age and type of the intrusions having importance. Generally the more pyritic Cretaceous stocks and pure limestones are associated with scheelite. Pyroxene-garnet-scheelite skarns have also formed in limestones of Lower Cambrian to Ordovician age and in the Ordovician limestones of the Road River Formation,as in the MacMillan Pass area, which contains the MacTung deposit (i.e. 60 million tons of 0.9% WO_3).

Exploration for tungsten was conducted by Canada

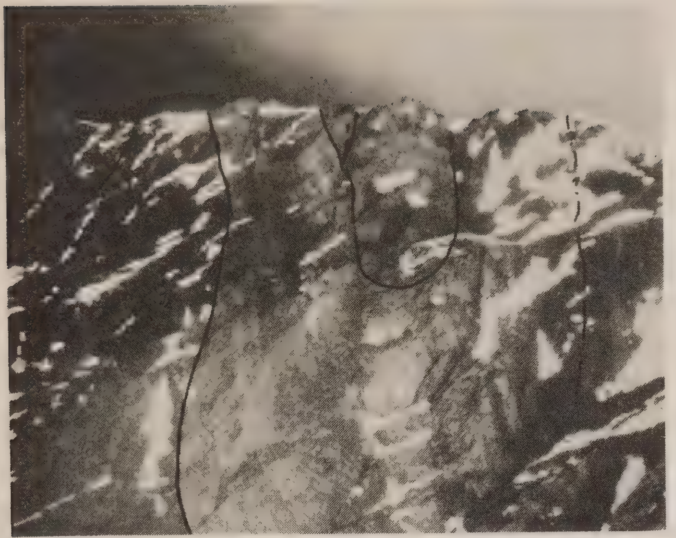


Figure VIII-12. Geological units exposed at Baker Prospect.

Tungsten Corp. Ltd. around the Tungsten mine site, Union Carbide on the Lened Prospect just west of the South Nahanni River, and by Amax at MacTung and the CAC claims adjacent to the Lened property.

BAKER PROSPECT — Tungsten
Canada Tungsten Corp. Ltd., — 105 H/6
P.O. Box 9, — $61^{\circ}57'$N, $128^{\circ}15'$W
Tungsten, N.W.T.

REFERENCES
Blusson (1968); Brown (1961);

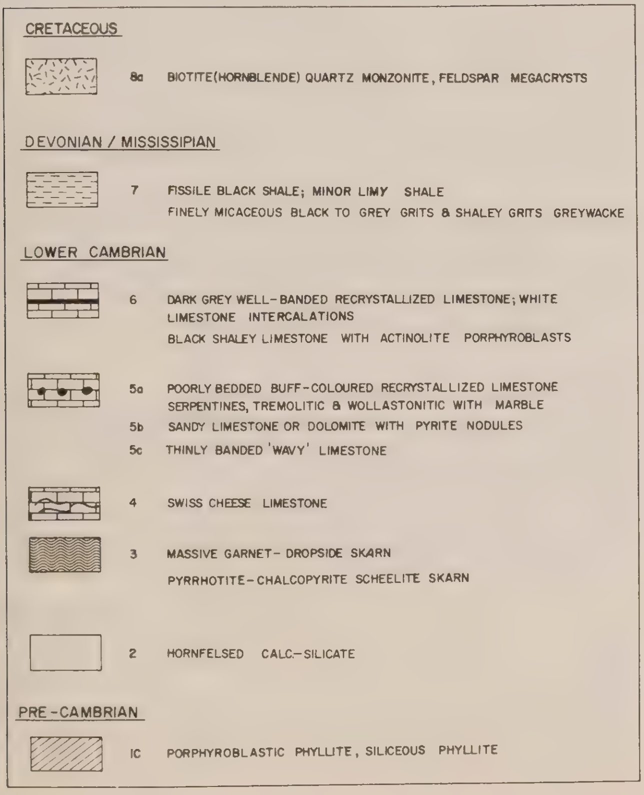


FIGURE VIII-13: Stratigraphic column - Baker Prospect

PROPERTY
Tungsten Mine property.

LOCATION
The Baker Prospect is on the southwest side of the Flat River, 5 km southeast of Canada Tungsten Mine.

HISTORY
Trenching and sampling were done in 1959. In 1966 the property was mapped and three holes drilled.

DESCRIPTION
The Baker prospect has the same mineralogy , grade and mode of occurrence as the Cantung Mine. The skarn zone, with a maximum thickness of 3 m,is exposed intermittently for about 90 m at the base of the Lower Cambrian ore-limestone member. The mineral body is tabular, on a moderately dipping limb near the crest of a gently southeast-plunging anticline. A small northwesterly-trending fault lies about 300 m to the southwest. Principal constituents of the skarn are pyroxene, garnet, quartz, calcite and idocrase. Accessories are scheelite, fluorite, sphene,sphalerite, pyrrhotite and chalcopyrite. Fluorite forms several percent of some specimens and sphalerite up to 10%.

A small scheelite-bearing skarn deposit, a short distance south of the Baker Prospect, has similar composition, except that garnet predominates, sulphides are absent and the grade is much lower. This tabular body appears continuous for several hundred metres at the top of the ore limestone but averages 1.5 m or less in thickness.

Near the midsection of the ore limestone above the Baker Prospect a 0.9 m-wide skarn zone occurs along both granitic dyke-limestone contacts. Mineralology, which is nearly the same as the Baker Prospect, includes minor scheelite and fluorite.

CURRENT WORK AND RESULTS
Detailed geological mapping, prospecting and geochemical surveys were done in 1978. Diamond drilling tested some of the anomalous areas.

LENED PROSPECT — Tungsten
Union Carbide Exploration Corp., — 105 I/7
Vancouver, B.C. — $62^{\circ}20'$N, $128^{\circ}35'$W

REFERENCES
Green and others (1967); Blusson (1968).

PROPERTY
Lened Group (43 PAN, JILL 1-8, CAL 1-97).

LOCATION
The Lened Group is 50 km north of Tungsten.

HISTORY
The Lened tungsten project was discovered in 1960 by Canex Aerial Exploration Ltd. who explored the area in 1961 by mapping, trenching, prospecting and diamond drilling. The claims were allowed to lapse.

H. Brodell staked the area in 1967 for Atlas Explorations Ltd. The claims were returned to him after trenching, geological, geophysical and geochemical surveys tested the property.

In 1973-74 Canex Placer explored the area by trenching and mapping. In 1977 Union Carbide bought the NIP 2, 4, 9 and 12 TOY claims from Brodell and

staked the PAN, CAL and JILL claims.

DESCRIPTION

The claims are underlain by Precambrian to Devonian clastics and carbonates intruded by Cretaceous quartz monzonite stocks. Well developed skarns are found at the contact between quartz monzonite intrusions and impure to pure limestones of Lower Cambrian age. Scheelite is commonly found in these skarns and appears to have more affinity with the garnet-rich variety. Pyrrhotite and chalcopyrite are found locally. The clastics, carbonates and skarn zones are folded into a westerly plunging overturned syncline, and displaced into a series of grabens and horsts by steeply to vertically dipping transverse faults.

FIGURE VIII-I4: Lened Property-Drill roads on skarn outcrop.

CURRENT WORK AND RESULTS

Geochemical and geophysical surveys, geological mapping and prospecting explored the claims. Sixteen diamond drill holes, totalling 1,525 m, tested anomalies outlined by these surveys.

Geological mapping was done at a scale of 1:2,000 using a plane table. VLF-EM-16 and proton magnetometer surveys were useful tools for geological interpretation.

The property is structurally complex and much effort was spent unravelling the folding and faulting phases. Particular attention was given to the distribution of the skarn zones and to the position, shape and plunge of the granitic front, as this appears to directly control the ore concentration and distribution.

More detailed work to explain the structural complexities is planned for next year.

CAC (Rhodes Tungsten Property)	Tungsten
Amax Potash Limited,	105/17
#601-535 Thurlow St.,	$62^{\circ}22'$N, $128^{\circ}38'$W
Vancouver, B.C.	

REFERENCES

Blusson(1968); Green and others (1968).

PROPERTY

CAC 1-21.

LOCATION

The Rhodes Tungsten property is 48 km north-northwest of Tungsten, N.W.T.

HISTORY

CAC 1-15 were staked in 1973. In 1974 geological mapping outlined several skarn zones, one of which lay outside the claim group. CAC 16-21 were staked in 1976 to cover this zone.

DESCRIPTION

The claims are underlain predominantly by Upper Cambrian to Ordovician limestones and Road River shales. A small porphyritic quartz monzonite stock intrudes these formations. This stock is the middle of three which are aligned in a northwesterly direction.

On the northern claims (CAC 1-15) garnet-diopside skarns are developed in limestones close to the stock. On the southern block (CAC 16-21) much of the skarn consists of wollastonite, tremolite and ferro-actinolite. Sulphide minerals are sparse and scheelite rare in the south skarn zone.

CURRENT WORK AND RESULTS

CAC 16-21 were prospected, mapped and geochemically sampled. Geological mapping outlined skarn zones of a different type to those exposed in CAC 1-15.

MACTUNG DEPOSIT	Tungsten
Amax Northwest Mining Co. Ltd.,	105 0/8
601-535, Thurlow Street,	$63^{\circ}17'$N, $130^{\circ}07'$W
Vancouver, B.C.	

REFERENCES

Blusson (1971); Harris (1977).

PROPERTY

BORDER 11; GUM 1-8; GUT 1-24; PIX 1-30; PUP 1-14.

LOCATION

The property straddles the Yukon-Northwest Territories border 11 km north of the Canol Road at MacMillan Pass. Access to the claims is by road from Ross River 208 km to the southwest, or from an airstrip at MacMillan pass.

HISTORY

Scheelite showings discovered in 1963 by J.F. Allan and staked by Southwest Potash Corporation, a subsidiary of American Metal Climax Incorporated were transferred to Amax Exploration Inc. in March, 1967. Amax Exploration changed its name to Amax Potash in 1971 and in 1972 transferred the claims to Amax Northwest. Mining lease 2605, Lot 166 covers 1,423 acres of the property.

Surface sampling and mapping were done in 1963 and 1964, followed by almost 10,600 m of diamond drilling in 1968 and 1971-73. In 1973, 735 m of underground exploration was done. Pilot mill tests were carried out on a 300 ton bulk sample. At the end of 1973, Amax published ore reserves of 30 million tons of 0.9% WO_3

DESCRIPTION

The property is underlain by fine-grained clastics and to a lesser extent carbonates of the Road River Formation. Scheelite, pyrrhotite and minor chalcopyrite occur in several pyroxene-garnet skarns developed from carbonates of the Road River Formation during intrusion of quartz monzonite stocks. The exact age of the carbonates is uncertain although Ordovician trilobites have been found a hundred feet stratigraphically above the deposit (Fig. VIII-18).

CURRENT WORK AND RESULTS

Site preparation was done during the summer in readiness for more underground sampling in 1979.

CARBONATE-HOSTED ZINC-LEAD

There was little exploration for carbonate-hostd zinc-lead deposits during 1978.

The main stratigraphic units explored were the Helikian Little Dal Formation around the Gayna River area and the Mt. Kindle and Franklin Mountain formations just northeast of Wrigley. In the Mackenzie Mountains lead-zinc deposits range in age from Proterozoic to Devonian and although in part structurally controlled, particularly in the Lower Cambrian strata, show many features similar to those of the Mississippi Valley type deposits of the United States. They have simple mineralogy, low precious metal content, occur in limestone or dolostone, are deposited at shallow depth, show evidence of solution activity and appear to be related to positive structures in areas devoid of igneous rocks (Ohle, 1959). However, many deposits in the Mackenzie Mountains typically are high grade veinlets showing erratic distribution and usually low tonnage potential, suggesting that many of the deposits that have been termed Mississippi Valley-type are in fact related to the tectonics produced by one or more of the orogenies that have affected these rocks.

Many of the small structurally-controlled deposits were found after and during 1972-73 in platform carbonates which show none of the diagenetic overprint typical of the Pine Point or Mississippi Valley environments. The eastern edge of the Selwyn Basin, where carbonates and shales interfinger and ecological reefs were developed, and around the southwestern edge of the Mackenzie Arch, particularly in the Ordovician-Silurian and Devonian rocks, may offer more potential than the supratidal cyclic carbonates of the Lower Cambrian Sekwi Formation.

RT CLAIMS	Zinc, lead
Rio Canex Exploration Ltd.,	106 B/15, 16
520, 800 W. Pender St.,	106 G/1, 2
Vancouver, B.C.	65°N 130°30'W

REFERENCES

Aitken and Cook (1974); Aitken, MacQueen and Usher (1973); Aitken (1977, 1978).

PROPERTY

792 RT claims.

LOCATION

The Rio Tinto camp is on the Gayna River 266 km west of Norman Wells. A short airstrip suitable for Helio Couriers lies just east of the camp.

HISTORY

The claims were staked in 1974 by Cordilleran Engineering for Rio Tinto to cover mineralization found by prospecting and regional geochemical surveys of the H5 and Little Dal carbonates.

DESCRIPTION

About 3,657 m of Upper Precambrian to Middle Devonian Strata are exposed on the RT claims (Fig. VIII-15).

The economically important formation is the Lower Little Dal, previously Helikian Map unit H5, (Aitken, MacQueen and Usher, 1973) which is unconformably overlain by Upper Cambrian Franklin Mountain red beds.

Lower Little Dal Group consists of a sequence of limestones, dolostones, sandstones, shales and evaporites. The 'basal sequence' (Aitken, 1977), consisting of shales and limestones, hosts large stromatolitic algal bioherms which form a discontinuous northwesterly trending belt of reefs. The reef-cores are apparently built of a variety of cryptalgal stromatolites, and flanked by thick, coarse reef-derived talus. According to Aitken (1978) the reefs, during their period of active growth, had relief of at least several tens of meters up to, possibly, one hundred meters above the floor of the basin; the stromatolites grew mainly subtidally in a low energy environment and the depositional tops of reefs where preserved are flat or stepped, and have apparently developed in an agitated and probably shallow subtidal environment. The 'basinal sequence' passes into the overlying 'grainstone sub-unit'. This hosts the majority of zinc-lead showings on the RT claim group and is characterized by dolomitized grainstones and sandy dolostones. A thick sequence of gypsum which conformably succeeds the grainstone sub-unit is overlain by black fissile shales (Fig. VIII-15).

Sphalerite in various forms and colours and galena are associated with a variety of features similar to those that host Mississippi Valley type deposits. The majority of showings are in brecciated dolostone members of the grainstone sub-unit, but some lie within the Paleozoic Franklin Mountain and Mt. Kindle Formations.

Sparsely mineralized large algal reefs are intimately associated with the sulphides which have accumulated in primary breccias developed on the flanks of the reef and in solution collapse and crackle breccias. The latter are the main sites of mineral deposition. The sphalerite may be pale green or orange-red and fills fractures or is present as disseminations and massive beds in structures produced either by tectonism or by karsting. Dolomite, calcite, pyrite, pyrobitumen and minor galena are associated with the sphalerite. Several periods of mineral deposition are indicated by brecciated fragments of sphalerite cemented by a later stage sphalerite (Hewton, 1976). The regional geological setting, style, mineralization and host structures indicate that the Gayna River property is of the Mississippi Valley type.

CURRENT WORK AND RESULTS

In 1978, detailed geochemical and I.P. surveys were completed over the RT claim block. Gravity and GEOPROBE-EM surveys were conducted over selected areas to determine the efficacy of these methods in delineating sulphide bodies. Systematic core sampling and logging elucidated the genesis of known

mineralization and its possible extensions. Aerial photographs were taken over the entire claim block.

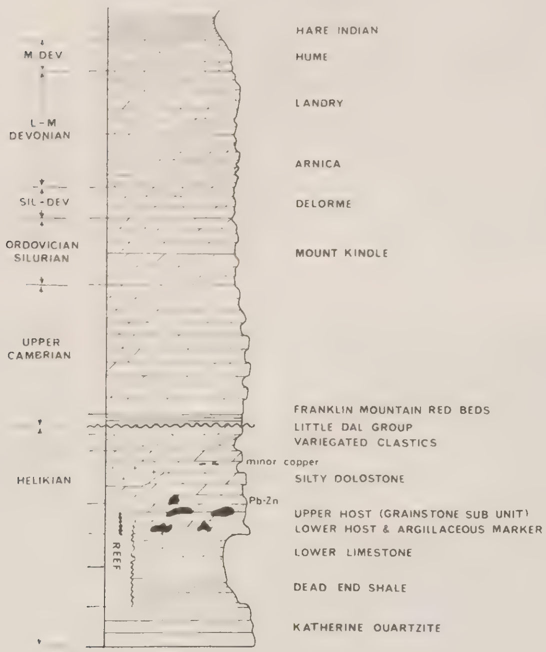


Figure VIII-15. Simplified Stratigraphic Column Scale: 1" = 1500' after Hewton 1976.

Dipole-dipole I.P. surveys delineated numerous anomalies, with some concentration and correlation over areas of known sulphides. Several sites were selected for further drill testing in 1979. I.P. results do not permit establishment of a unique resistivity signature for Gayna River mineralization because it has highly variable pyrite, galena, and sphalerite abundances.

Tests with GEOPROBE-EM proved inconclusive and failed to provide quantitative depth estimates for broadly anomalous I.P. zones. Because of patchy dolomitization and erratic brecciation, no unique resistivity signature was determined; however, weak low resistivity breaks correlated well with drill intersected sulphide zones within a larger breccia unit. No further tests are planned.

Gravity survey proved the existence of zones of "excess mass" which correlated with accumulations of high grade sulphides. Anomalies were also generated by differences in lithology and by uncorrected terrain/elevation effects. Further surveying and drill testing of the gravity anomalies are to be done in 1979.

WRIGLEY PROJECT	Lead, zinc
Giant Yellowknife Mines Ltd.,	950
Yellowknife, N.W.T.	63°25'N, 123°25'W

REFERENCES

Douglas and Norris (1973); Norford and MacQueen (1975).

PROPERTY

None; Regional Exploration

LOCATION

32 km northeast of Wrigley.

DESCRIPTION

Breccias and pseudobreccias of the Mt. Kindle and Franklin Mountain Formations were prospected for Mississippi Valley type lead-zinc mineralization.

CURRENT WORK AND RESULTS

After several weeks of prospecting the program was terminated.

PRECIOUS METALS

Diapros did extensive stream sampling from just south of Inuvik to Fort Simpson. Most of the major creeks and rivers that drain the Interior Plain were sampled for diamonds or evidence of diamond bearing kimberlites.

Kimberlite diatremes are usually found in tectonically passive regions hence the concentrated effort in the Interior Plains.

E. Linberg prospected for gold on the Liard River, south of Nahanni Butte; fine flake gold can be found associated with black sands in most point bar situations.

Gold appears to be of the 'flood gold' variety although a section taken of the river bank which was sampled and panned indicated that the gold has accumulated in the finer sands and clays producing a normal type placer.

Figure VIII-16
Debris from rock slide - Natla River.

Figure VIII-17
Barite bed on Vulcan Property, South Nahanni.

Figure VIII-18
Cadillac Mining Camp, Prairie Creek

Figure VIII-19 Blowouts, South Nahanni

Figure VIII-20 Debris from rock slide has diverted stream to its present course.

Figure VIII-21
Howard's Pass Lead-Zinc Deposit.

Figure VIII-22
Diatreme intruding Road River Shales, Cominco's Permit, Misty Lake area.

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NATIONAL TOPOGRAPHIC SYSTEM INDEX OF COMPANIES

GENERAL INDEX

CHAPTER IX

SEDIMENTOLOGY OF THE SNOWBLIND BAY FM., CORNWALLIS ISLAND, N.W.T.

A PRELIMINARY REPORT

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INTRODUCTION

The Lower Devonian Snowblind Bay Formation is a 577-m thick coarsening-upward sequence of terrigenous clastic sediments. Current research includes the systematic study of 1) sedimentology; 2) process-response relationships to source areas during tectonic uplift; 3) paleogeographic reconstructions and 4) comparison to other regressive clastic wedges along the Boothia Uplift during Upper Silurian and Lower Devonian time.

This report considers the sedimentology of the Snowblind Bay Fm. as a regressive coastal fan complex.

The north-trending Boothia Uplift (Fig.1X-1) rose and, during Upper Silurian - Lower Devonian time, synorogenic and postorogenic molasse wedges were shed from it. These include rocks forming the Peel Sound Formation, Snowblind Bay Formation, and Prince Alfred Formation (Fig. 1X-2).

The Snowblind Bay Formation is preserved in a broad, open, northeast plunging syncline (Fig. 1X-3). Its lower contact is arbitrarily defined as the base of the stratigraphically lowest conglomerate bed (Thorsteinsson and Uyeno, 1980). The underlying Sophia Lake Formation represents a package of sediments that was deposited in an essentially shallow, subtidal to intertidal environment.

The remainder of this report will deal with the sedimentology of a progradational coastal fan complex consisting of the lowermost fine-grained facies association or tidalite sequence; sandstone-conglomerate facies association or distal alluvial fan complex; and the uppermost conglomerate facies association or mid-proximal alluvial fan sequence (Fig. 1X-4).

Lithofacies observed in the Snowblind Bay Formation include:

Cf - silty dolostone

Fl - laminated siltstone

Fmd - mottled, massive siltstone

Sh - horizontally-stratified mudstone

Sl - low-angle stratified sandstone

St - trough cross-stratified sandstone

Sp - planar cross-stratified sandstone

Sr - rippled sandstone

Gm - massive- to horizontally-stratified, framework-supported conglomerate

Gp - planar cross-stratified conglomerate

Gt - trough cross-stratified conglomerate

FINE-GRAINED FACIES ASSOCIATION

The fine-grained sequence is dominated by sandstone, siltstone, and dolostone with less than 10% conglomerate (Figure 1X-24).

An intertidal depositional environment is proposed for this assemblage based on evidence of tidal traction currents, slack-water sedimentation, late-stage emergence structures prior to exposure, and terrestrial sheetflood sedimentation derived from the fan-delta.

The proportion and range of thickness of the major lithofacies is presented in Figure 1X-5. The fine-grained facies association is partly obscured by covered intervals but ranges between 70-220 m in thickness. The representative section of the fine-grained facies association is shown in Figure 1X-6.

There appears to be an association of low-energy bedform structures and thin conglomerate beds with the interbedded mudstone-dolostone lithologies of the mixed mudflat depositional environment. High-energy bedform structures and abundant evidence of bioturbation and burrowing are associated with the interbedded sandstone and dolostone lithologies of the sandflat-tidal flat depositional environment.

Although pulses of high energy terrestrial flood deposits and subsequent progradation of the mixed mudflats may be observed, the succession of lithofacies is unpredictable. Deposition is influenced by terrestrial floods, tectonic uplift of the source area and subsidence of the basin, lateral shifts of depocenters as fan delta lobes migrated across the fan delta complex, tidal currents, and storm activity. Thus, cyclic sedimentation was repeatedly interrupted (Daily and others, 1980).

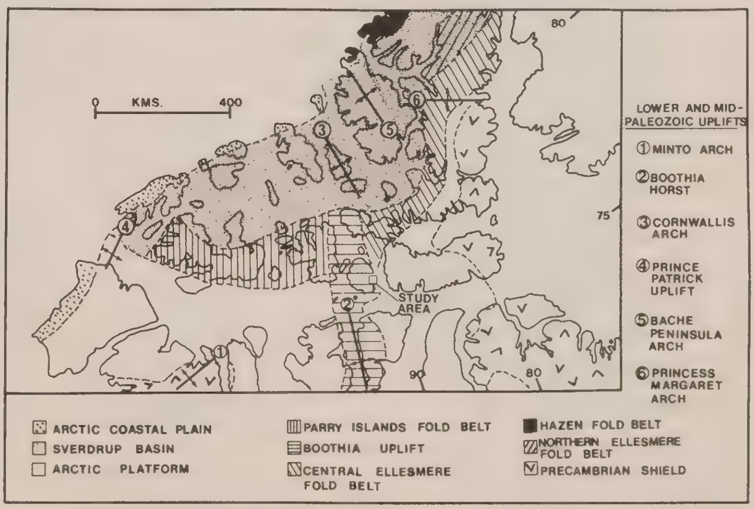


FIGURE IX-1: Geological framework of study area.

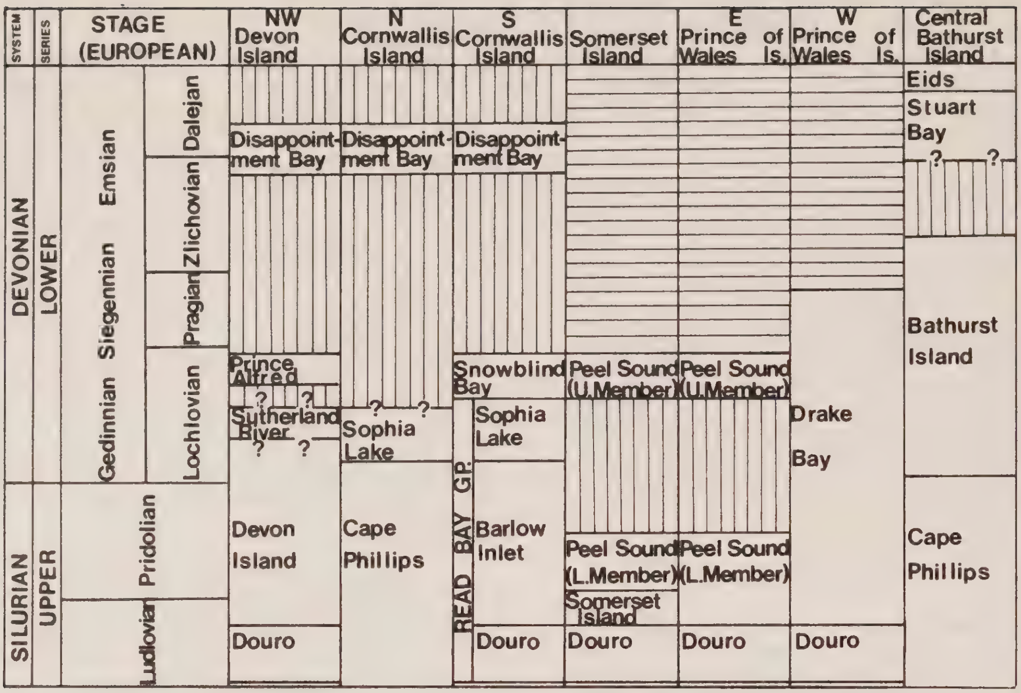
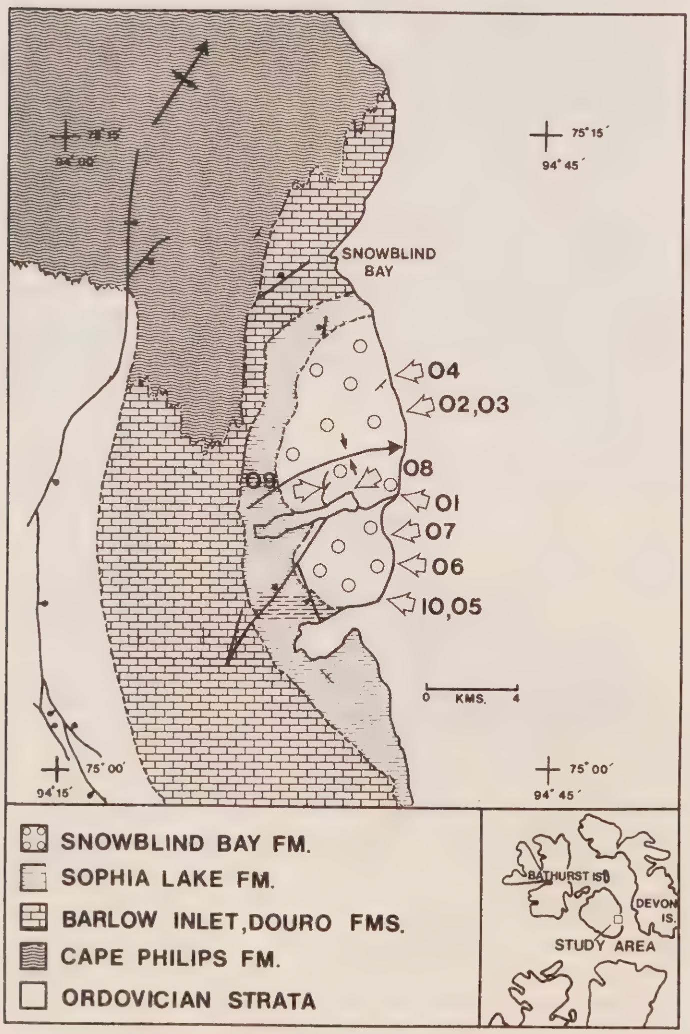


Figure IX-2: Formations in and adjacent to the study area.



In sediments of the mixed mudflat depositional environment, Fl (laminated siltstone) is the dominant lithofacies with subordinate lithofacies including silty dolostone (Cf), horizontally-stratified sandstone (Sh), low-angle cross-stratified sandstone (Sl), and massive to horizontally-stratified, framework-supported conglomerate (Gm). The association of Gm lag beds indicates relative proximity to a terrestrial source area. Reworking of sediments on the mudflats is indicated by flaser and lenticular bedding (alternation of high energy traction current sedimentation and slack-water suspension sedimentation).

Interference ripples suggest emergent run-off phases prior to subaerial exposure. Structures indicative of rapid fluctuations in water depth and intermittant exposure include: runzel marks, double-crested ripples, symmetrical flattened wave ripples, desiccation and syneresis cracks, and salt casts. Periodic high sedimentation rates are suggested by abundant loaded and gradational bed contacts, water escape structures, and climbing ripple lamination.

Sediments of the tidal-sandflat depositional environment were deposited by higher energy bedload transport processes offshore from the mixed mudflats. Reactivation surfaces in low-angle stratified sandstones and dolarenites may suggest time-velocity asymmetry of tidal influenced traction currents. Minor late-stage emergent structures are indicated by mudcracked siltstone partings and abundant green siltstone intraclasts. Trace fossils identified by Guy Narbonne (Univ. of Ottawa), suggest a *Skolithos* ichnofacies which probably inhabited a high-energy marine environment.

Figure IX-3: Geological map of study area.

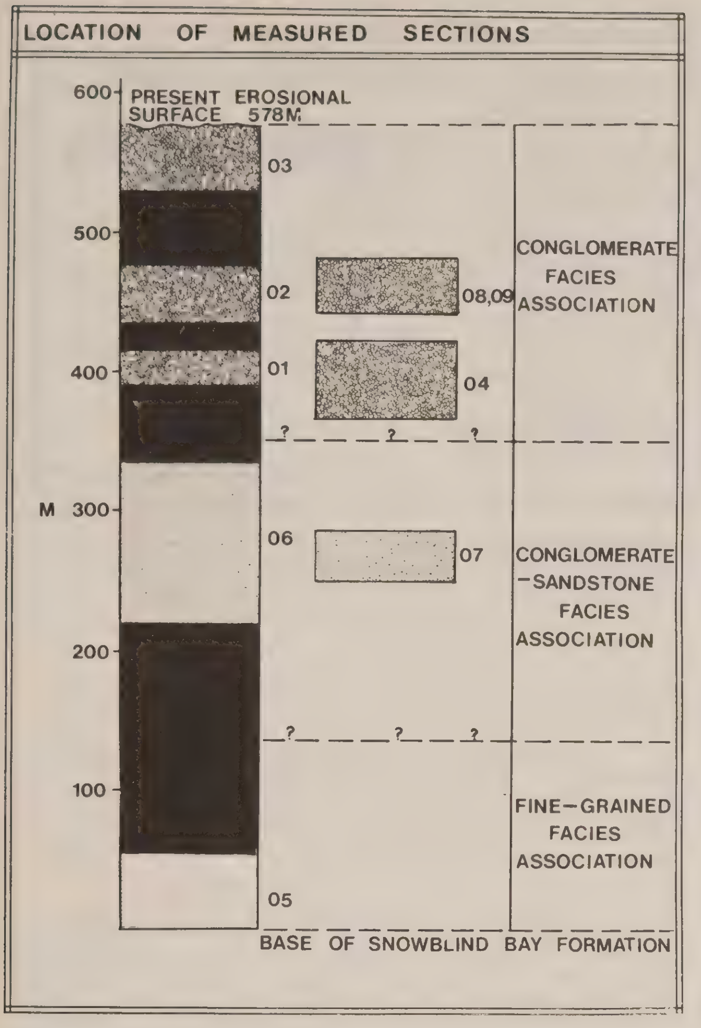


Figure IX-4: Stratigraphic column for Snowblind Bay Formation, showing relative positions in the column of the measured sections.

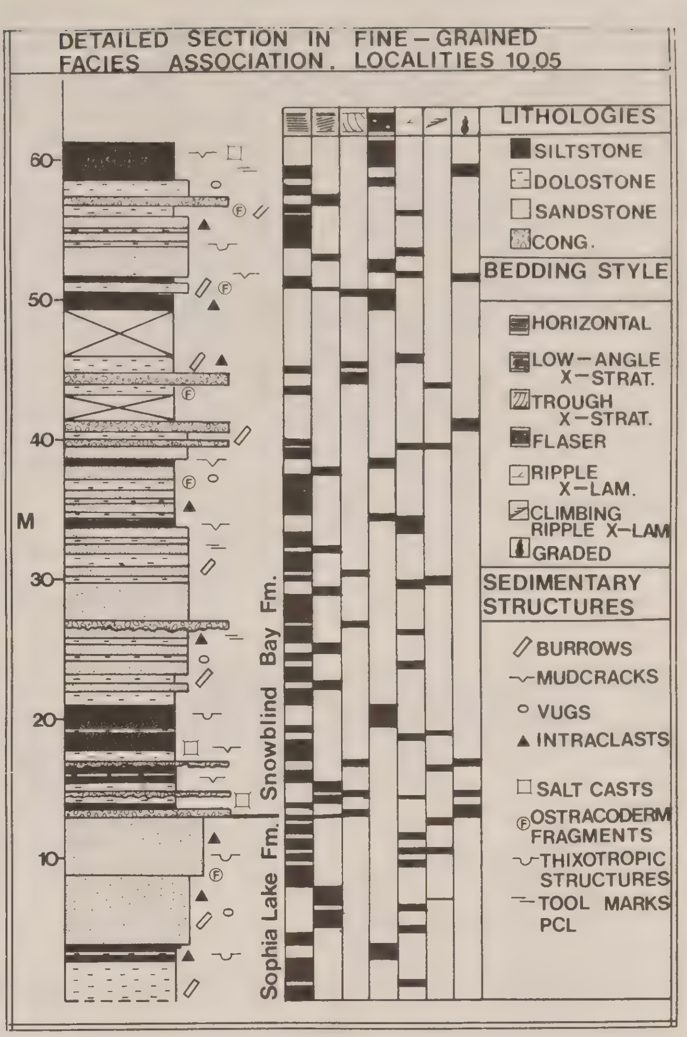


Figure IX-6: Detailed stratigraphic section of fine-grained facies association at locality 10, 05 (Figure IX-3).

LITHOFACIES	%	UNIT THICKNESS (M.) MIN.	MEAN	MAX.
Cf	29.9	0.20	0.70	1.20
Fl	21.6	0.18	1.17	4.60
Fmd	2.9	0.33	0.52	0.63
Sh,Sl	40.9	0.04	1.17	3.70
Gm,Gt	4.6	0.30	0.50	0.80
	~100			

LITHOFACIES IN THE FINE-GRAINED FACIES ASSOCIATION

Figure IX-5: Proportion and range of thickness of the major lithofacies of the fine-grained facies association.

The poorly-channeled, sheet-like geometry of the lithofacies constituting the tidalite sequence was controlled by terrestrial sheet floods with minimal reworking by weak tidal currents.

SANDSTONE-CONGLOMERATE FACIES ASSOCIATION

The assemblage of lithofacies which forms the sandstone-conglomerate facies association (Fig.lX-25-a) of the distal alluvial fan sequence are products of cyclic fluvial processes. Relative proportions of lithofacies and their respective range in thicknesses are shown in Figure lX-7. This facies association overlies the fine-grained facies association, and its estimated total thickness is between 120-300 m.

Embedded Markov chain analysis was employed on a 120-m section covering 146 transitions (Fig. lX-8, -9). Two major types of fining-upward cycles are outlined by the path diagram.

LITHOFACIES	%	UNIT THICKNESS (M) MIN.	MEAN	MAX.
Gm, Gt	43.9	0.30	1.55	4.75
St	17.8	0.16	1.03	2.13
Sh	22.7	0.07	0.63	1.90
Sl	3.0	0.20	0.48	0.86
Sr	5.7	0.09	0.42	0.84
Fl, Fmd	7.1	0.02	0.52	1.30
	≈100			

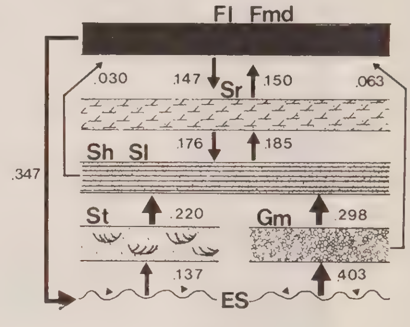
LITHOFACIES IN THE CONGLOMERATE – SANDSTONE FACIES ASSOCIATION

Figure IX-7: Relative proportions of lithofacies in the conglomerate-sandstone facies association.

DIFFERENCE MATRIX

	ES	Gm	St	Sh, Sl	Sl	Fl, Fmd
ES	0.000	.403	.137	-.304	-.133	-.103
Gm	-.110	0.000	-.167	.298	-.085	.063
St	-.026	-.017	0.000	.220	-.136	-.040
Sh, Sl	-.019	-.027	-.168	0.000	.185	.030
Sr	-.067	-.155	-.104	.176	0.000	.150
Fl, Fmd	.347	-.057	-.156	-.281	.147	0.000

PATH DIAGRAM



$\chi^2 = 185.7$ [HARBAUGH AND BONHAM-CARTER 1970]

No. of transitions = 146   Limiting value = 30.1 [95 % CONFIDENCE LEVEL]

Figure IX-9: Markov chain analysis data for conglomerate sandstone facies association.

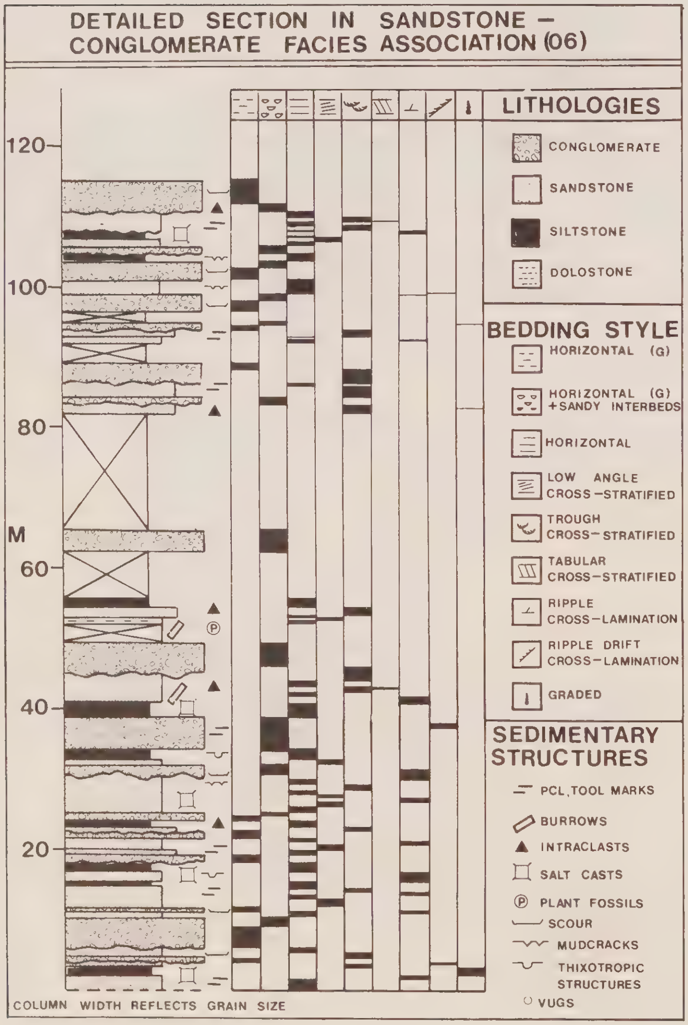


Figure IX-8: Detailed stratigraphy of a 120 m section in sandstone - conglomerate facies association, measured at site 06, Figure IX-3.

The sheet-braided cycle (Fig.1X-25-b) formed in response to changes in discharge and sediment load during lateral accretion and channel aggradation in shallow braided streams (Maill and Gibling 1978). The fining-upward cycles yielded a 3.0 m representative cycle (Fig. 1X-10).

Coarse, poorly-sorted bottom load was primarily transported as sinuous crested dunes within wide channels. This bedform gave rise to shallow trough cross-stratified sandstone (St) (Walker 1976). Minor lateral lithofacies variations indicate differences in velocity and load at any given stage during flood conditions (McKee and others 1965). Relatively low-dipping trough foresets are attributed to strong current movement. As the water level dropped, the dunes were modified (Collinson 1978). After planation of the bar tops by shallow, rapidly-flowing water, horizontally-stratified sandstone (Sh) was deposited under high flow regime conditions. As the velocity and depth of the floodwaters decreased, finer sediment was deposited by vertical accretion processes. Exposure and desiccation of these fine-grained sediments are indicated by salt casts, mudcracks and intraclasts, (Fig. IX-24-b,-c).

The sheetflood cycle (Fig 1X-11) displays a fining-upward sequence which is primarily a response to waning floods. Beds are superimposed at progressively decreasing energy conditions (Maill 1977), and generally display sharp, flat basal contacts and upward diminishing thicknesses. The channel deposits average 2.1 m in thickness and consist of minor horizontally stratified mudstone and low-angle stratified sandstone (Sh, Sl) lenses. Bed load was transported under sheetflood conditions (lateral bed continuity >400 m perpendicular to the depositional strike). A low ratio of water depth to particle size may have suppressed development of slipfaces.

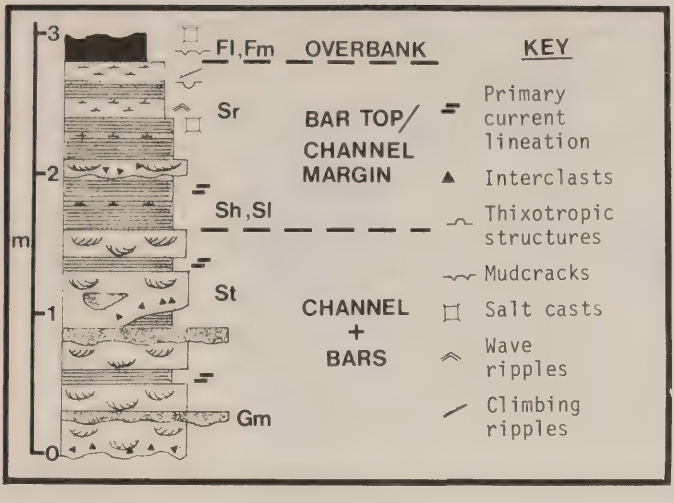


Figure IX-10: Sheet-braided fluvial cycle in the conglomerate-sandstone facies association. Representative cycle from data observed in 10 fining cycles from section 06, Figure IX-3.

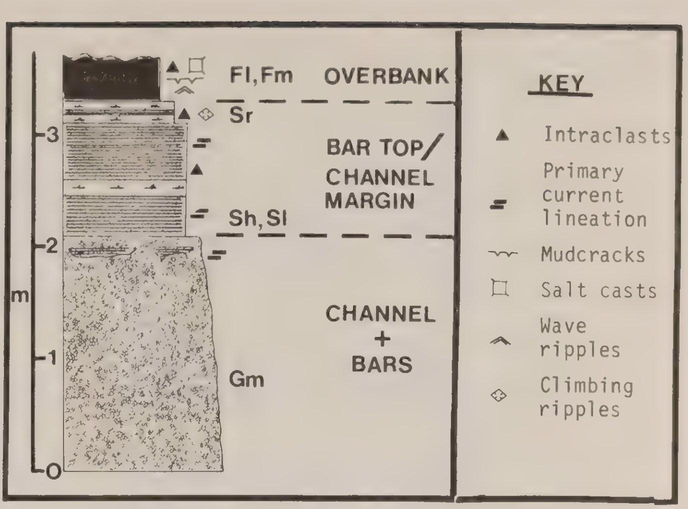


Figure IX-11: Sheetflood fluvial cycle in the conglomerate-sandstone facies association. Representative cycle from data observed in 12 fining cycles from section 06, Figure IX-3.

Finally, below the level of competency to transport pebbles, sand was transported as a carpet across the gravel bartops under a high flow regime, producing horizontally-stratified sandstone (Sh), and low-angle stratified sandstone (Sl). Laminated siltstone represents the terminal portions of the sheetwash.

The thickness of both types of fluvial cycles (3-4 m), common fining-upward trend, and sheet-form geometry indicate large volumes of sediment were deposited. At high discharge conditions, sheetflood sedimentation was prevalent. A series of diffuse gravel sheets were deposited in response to flood conditions (Hein and Walker, 1977). The normally graded units display positive maximum partical size - bed thickness correlation (Fig. IX-12). Loss of competency and deposition of transported load are related to the waning stages of each flood.

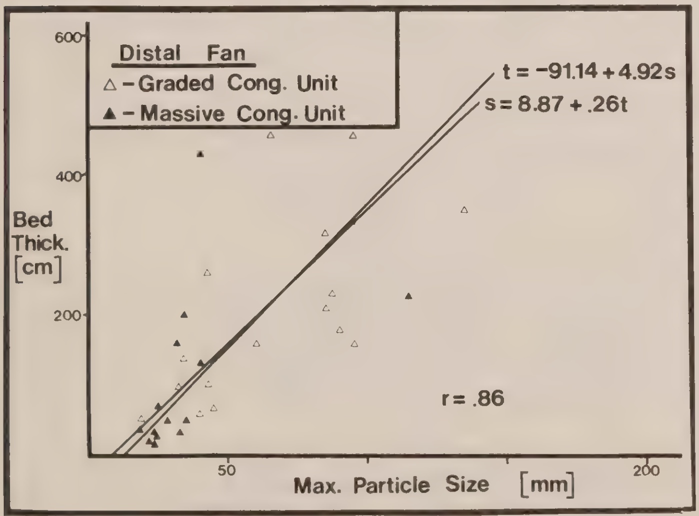


Figure IX-12: Graph of bed thickness versus maximum particle size in the conglomerate-sandstone facies association.

At lower discharge conditions, flow was confined to shallow braided streams. Flow may have become channeled because of a decrease in suspended sediments, although channels were rarely observed. Evidence of reworking is suggested by increased abundance of erosional surfaces and better sorting of the conglomerate beds. Frequent changes in flow depth and velocity would have enhanced braiding and subsequent erosion of low energy bedforms (Bull 1977).

CONGLOMERATE FACIES ASSOCIATION

The conglomerate facies association (Fig. IX-25-c,-d) or the mid-proximal alluvial fan sequence, stratigraphically overlies its finer distal equivalent (sandstone-conglomerate facies association). The minimum thickness for the assemblage ranges from 210 to 240 m. The present-day erosional surface marks the top of the facies association and the Snowblind Bay Formation.

The conglomerate facies association is more than ninety percent conglomerate (Fig. IX-13). Average unit thicknesses are greatest in this assemblage.

LITHOFACIES	%	UNIT THICKNESS (M)		
		MIN.	MEAN	MAX.
Gm, Gp	96.7	0.30	2.30	5.60
Sh	1.8	0.03	0.15	0.31
Sl, St	1.5	0.04	0.15	0.35
Sr	0.02	0.03	0.03	0.03
	~100			

LITHOFACIES IN THE CONGLOMERATE FACIES ASSOCIATION

Figure IX-13: Table showing lithofacies in the conglomerate facies association.

The following criteria suggest that 'carplets' comprised of massive - to horizontally - stratified framework - supported conglomerate (GM) and horizontally - stratified sandstone (Sh) were deposited by single flood episodes:

1) Regular, sheet-like geometry of the conglomerate units with only minor shallow scouring of the underlying beds. The fabric is formed by fluvial traction currents (clast AB plane imbrication: 25-30°, current-normal a-axis orientation).
2) Lower gradational contacts of horizontally stratified sandstone (Sh), low-angle cross-stratified sandstone (Sl) beds with the immediately underlying massive to horizontally stratified framework-supported conglomerate (Gm) units, indicated common depositional processes (Wilson 1980).
3) Grading (Fig. 1X-25-c) in the conglomerate units [coarsening-upward then fining-upward (Cu-Fu, fining-upward (Fu)], and minor normal grading in the overlying horizontally stratified sandstone (Sh), low-angle cross-stratified sandstone (Sl) beds suggest waxing and waning flood conditions.
4) significant positive correlation between the maximum particle size and bed thickness indicates a relationship between competency and discharge (Black 1967) (Fig. 1X-14,-15).

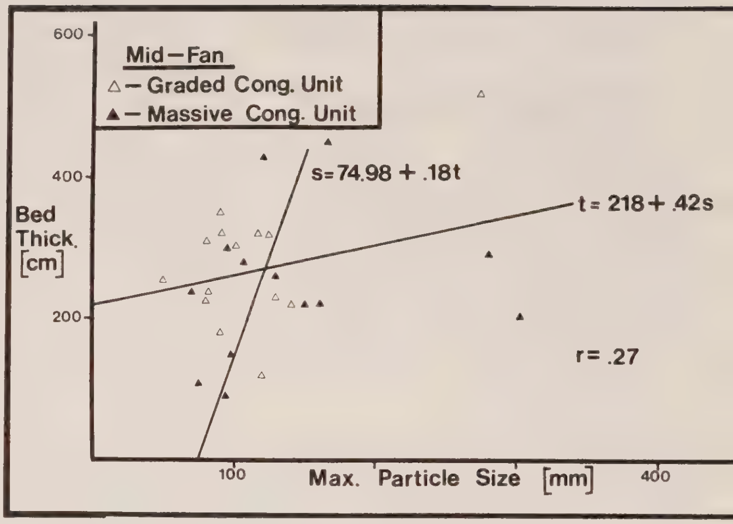


Figure IX-14: Graph relating bed thickness to maximum particle size in the conglomerate facies association - sections 03, 04.

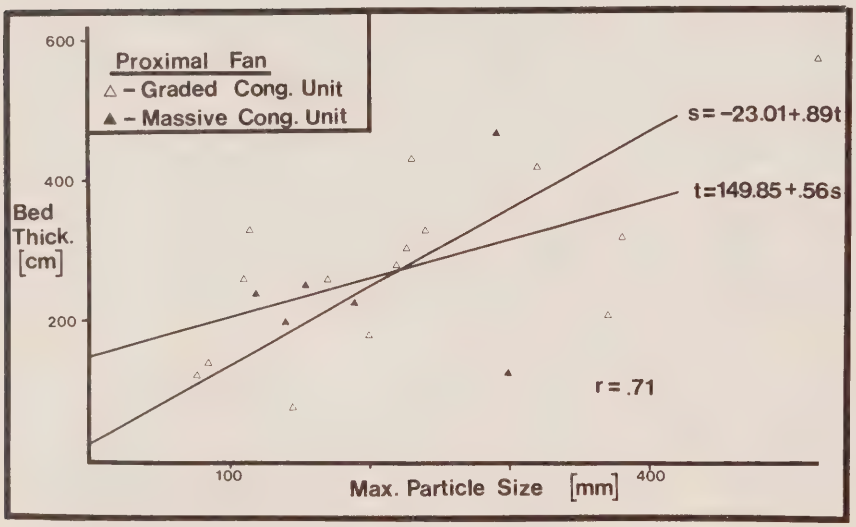


Figure IX-15: Graph relating bed thickness to maximum particle size in the conglomerate facies association - sections 08, 09.

Matrix-supported conglomerates of debris flow origin were not observed, but a six meter unit in section 09 is interpreted as a surge deposit in a fanhead entrenchment environment. The largest clasts were oriented parallel, with their maximum cross-sections normal to the acting dispersive pressure (Lewis and others 1980). Further support could have been provided by excess pcre pressures. The clast concentrations which define the stratification may represent amalgamated beds deposited by periodic surges.

Cu-Fu (coarsening upwards-fining upwards) cycles are superimposed on a large scale to constitute 7-30 m Cu-Fu sequences (Fig. 1X-16). Fault movement could have triggered periods of increased mass movement followed by sufficient time between fault movement to allow completion of the sedimentary response (Daily and others 1980). The sequence may have also been caused by the migration of a fan lobe to a topographic low on the fan surface.

Stacked Cu-Fu sequences in turn reflect the overall increasing pulsation of tectonic uplift as the alluvial fan built outward over its distal facies equivalents. This coarsening-upward megasequence is indicated by an increase in unit thickness and maximum particle size in the Snowblind Bay Formation (Fig. 1X-17).

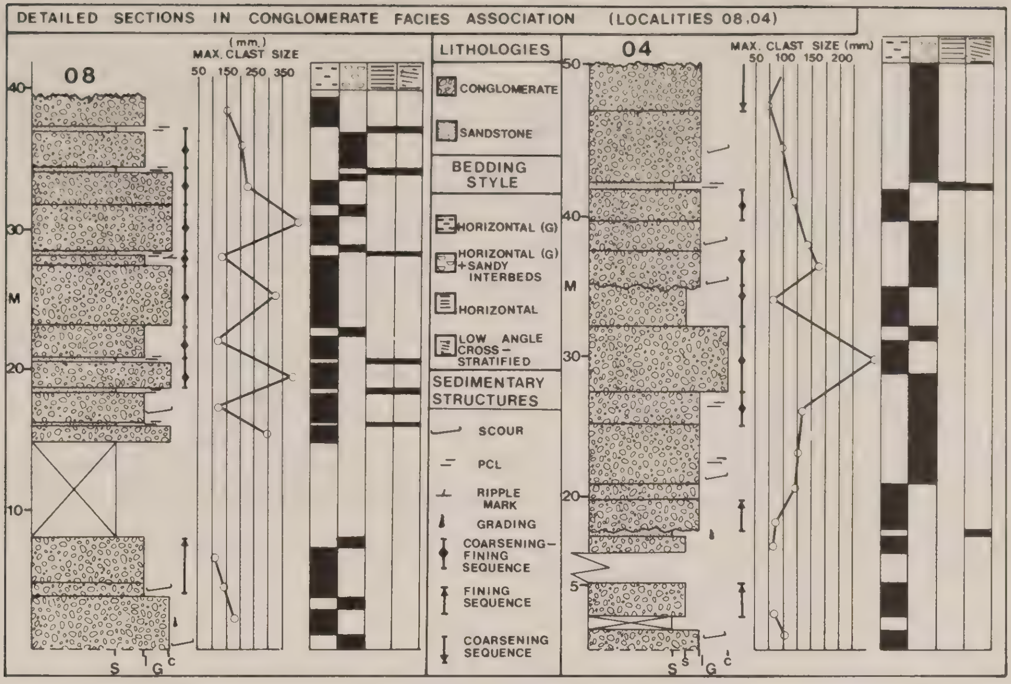


Figure IX-16: *Detailed sections in conglomerate facies association (08,04 Fig. IX-3), showing large scale superposition of nested Cu-Fu (coarsening upwards - fining upward cycles).*

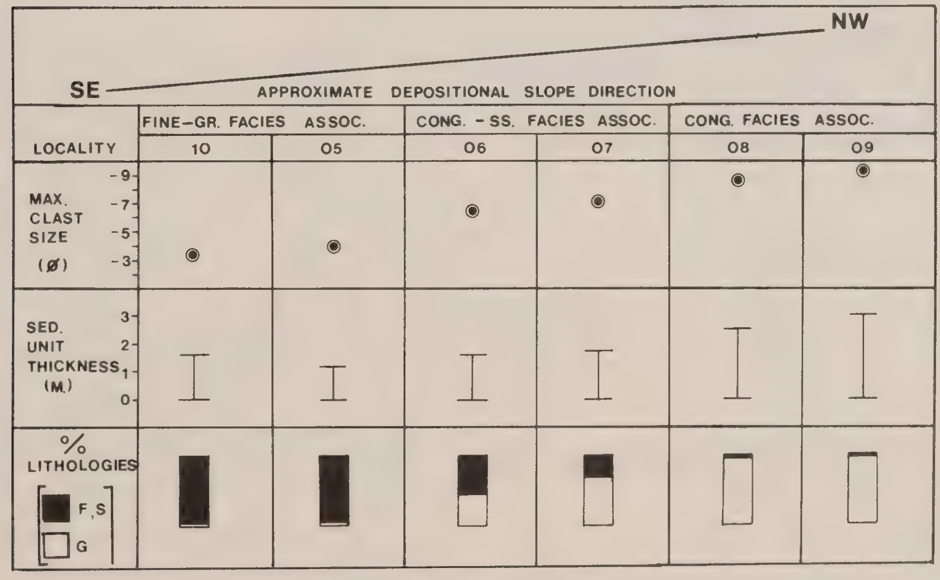


Figure IX-17: *Downslope trends for maximum clast size, sedimentary unit thickness, and relative abundance of lithologies in the Snowblind Bay Formation. These variations in unit thickness and maximum particle size are characteristic of a coarsening upward megasequence.*

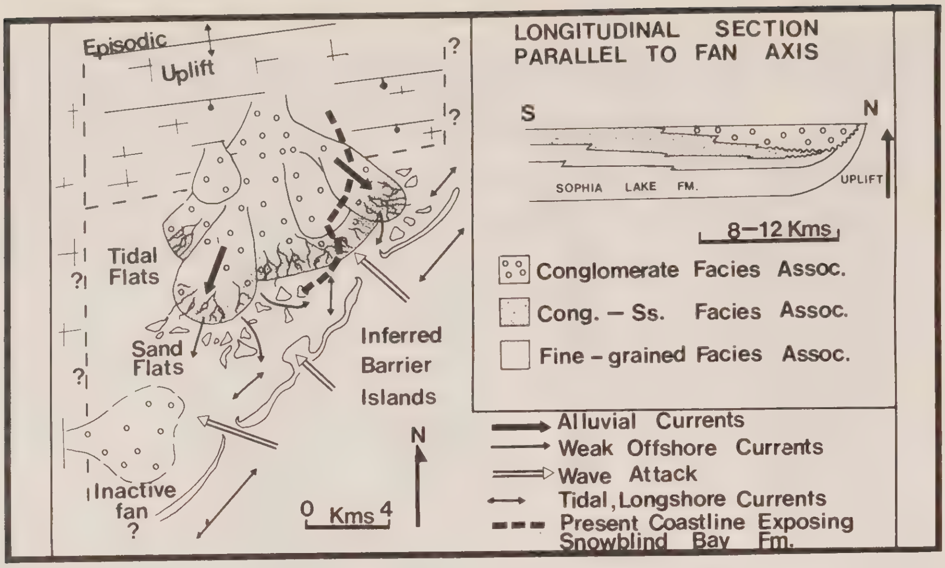


Figure IX-18: Paleogeographic reconstruction of the Late Lochlovian Snowblind Bay Formation showing the paleographic evolution, progradation of a subaerial fan across a tidalite sequence.

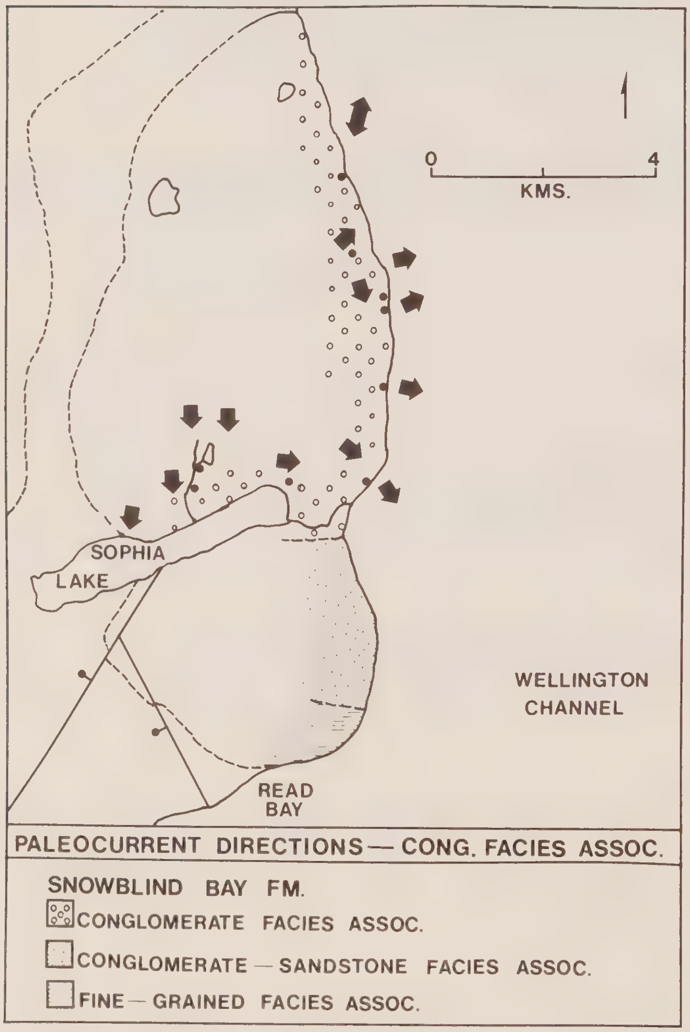


Figure IX-19: Directional features in the conglomerate facies association indicating fan dispersal of sediment.

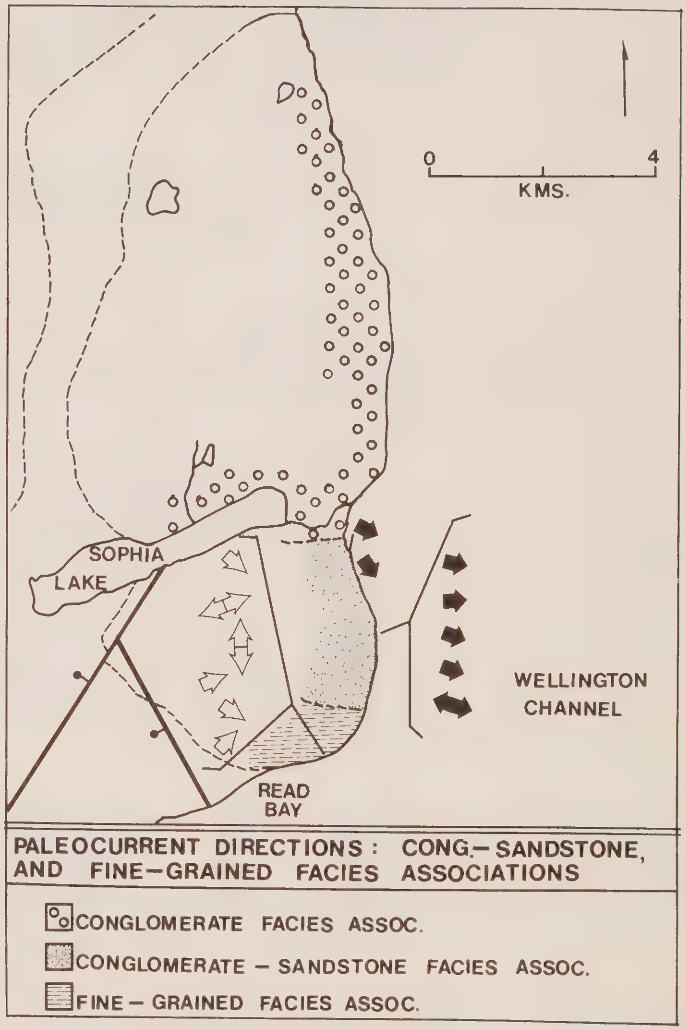


Figure IX-20: Showing palocurrent directions in the conglomerate-sandstone facies association consistent with those in the overlying conglomerate shown in Figure IX-17.

SUMMARY

The paleogeographic evolution of the Snowblind Bay Formation is represented by the progradational nature of the subaerial alluvial fan over the tidalite sequence (Fig. 1X-18). Limited tidal reworking may be due to the interference of narrow barrier island complexes, perhaps derived from inactive coastal fans along the Boothia Uplift.

Directional features in the conglomerate facies association indicate fan dispersal of the sediment (Fig. 1X-19). Paleocurrent data is consistent with that data obtained from the underlying sandstone-conglomerate facies association (Fig. 1X-20). The distribution of the assemblages displays a north, northwest source area.

Bed contacts are predominantly sharp and flat in the alluvial fan sequence with an increase in erosional, irregular contacts in the distal fan portion (Fig. 1X-21). Flow becomes channelized in part because of a decrease in suspended sediment concentration. As expected, there is an increase in load and gradational contacts as terrestrial sheet floods deposited fines into the sea (tidalite sequence).

Other downfan trends display an increase in structures formed during low discharge flood conditions (Fig. 1X-22, 23). Proximity to marine influences is indicated by the intertidal trace fossil, *Polarichnus* and planilites debris in the conglomerate-sandstone facies association.

Low energy bedform structures were more readily preserved in the distal fan - tidalite sequences (Fig. 1X-23) as attested by the incidences of low-angle, trough, ripple, and climbing ripple cross-stratification. Graded conglomerate units are much more frequent in the alluvial fan sequence. Finer conglomerate units were more reworked into longitudinal bars downfan. Downslope trends from maximum clast size, scale of sedimentary unit and relative abundance of lithologies point to a source region to the north-northwest.

FACIES ASSOCIATION	BED CONTACTS (%) SHARP, FLAT	EROSIONAL, IRREGULAR	LOADED	GRADATIONAL
CONGLOMERATE	60.6	18.1	—	21.3
CONGLOMERATE -SANDSTONE	49.0	33.0	2.8	15.1
FINE-GRAINED	46.0	7.0	10.0	37.0

GENERAL ABUNDANCE OF BED CONTACT TYPES

Figure IX-21: Table showing the increase in erosional, irregular contacts in the distal fan portion of the alluvial fan sequence. Note the increase in load and gradational contacts as terrestrial sheet floods deposited fines into the sea (tidalite sequence).

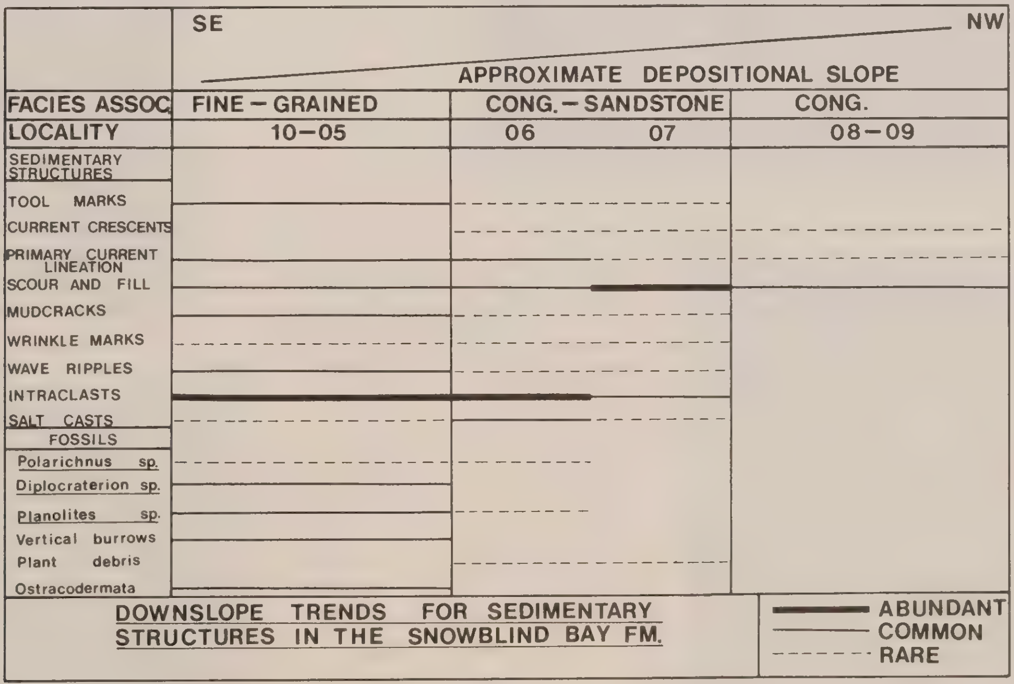


Figure IX-23: Downslope trends displaying an increase in structures formed during low discharge flood conditions. Additional data in Figure IX-22.

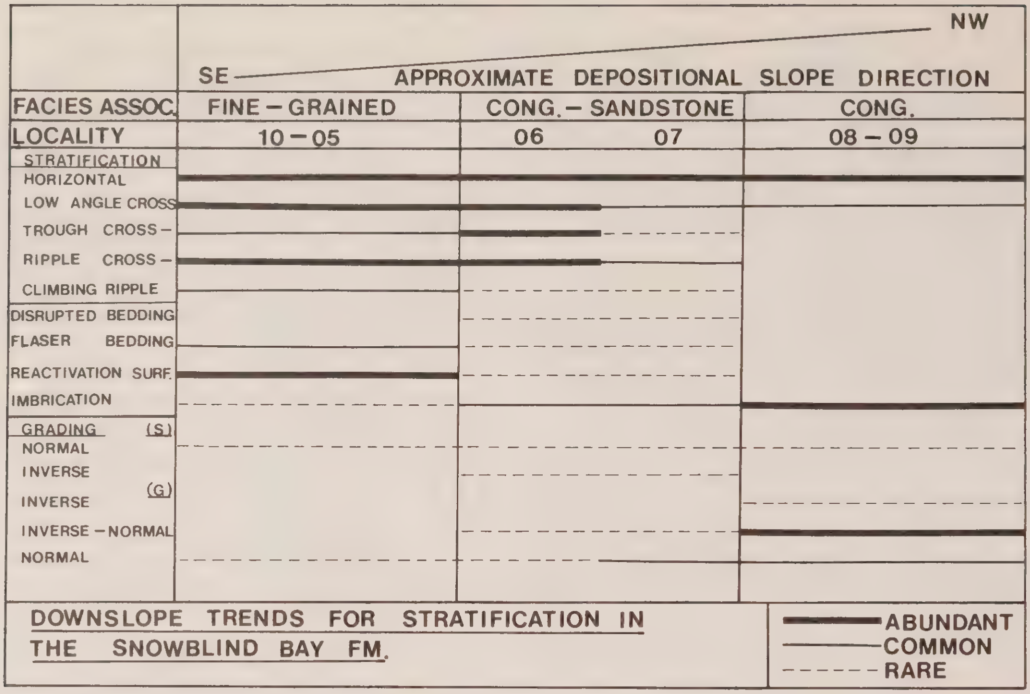
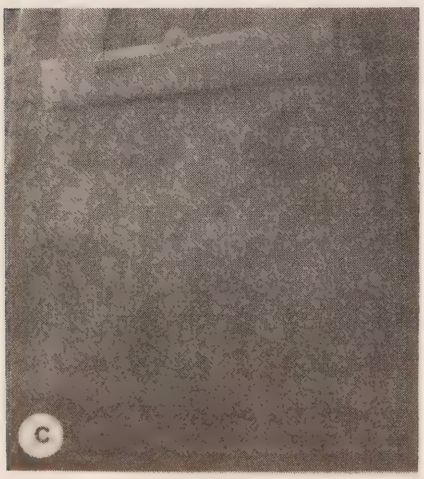


Figure IX-23: Downslope trends displaying an increase in structures formed during low discharge flood conditions. Additional data in Figure IX-22.

24-a. Lenticular bedding, section 05.

24-b. Mud-draped asymmetrical ripples with syneresis cracks, section 05.



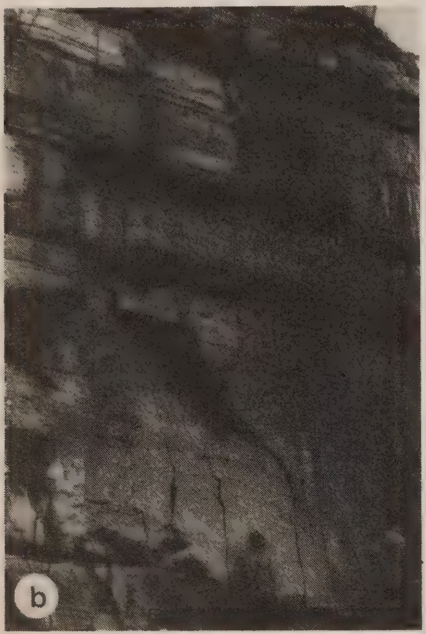
24-c. Halite casts, section 05.

24-d. Interference ripples, section 06.

Figure IX-24: Photographs showing sedimentary features typical of the fine-grained facies association.

25-a. Cliffs 40m high in sandstone-conglomerate facies section 06, 07.

25-c. Grading (CU then FU) in conglomerate facies section 02.



25b: Coarsening upward (CU) then fining upward (FU) sheetflood cycles in sandstone-conglomerate facies, section 02.

25-d. Thick conglomerate units (Gm) and thin extensive siltstone units (Fl) in conglomerate facies, section 02.

Figure IX-25. Sedimentary features the the sandstone-conglomerate and conglomerate facies associations.

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STRATIGRAPHY OF AN UPPER SILURIAN CARBONATE SHELF SEQUENCE ON CORNWALLIS AND NEARBY ISLANDS

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INTRODUCTION

The work of Kerr & Christie (1965), Brown, Dalziel, & Rust (1969), Kerr (1977), Gibling & Narbonne (1978), and more recently Thorsteinsson and Uyeno (1980), has documented the history of the Boothia Uplift and the effects of episodic movements of the Boothia Horst on the disposition and sequential development of surrounding sedimentary facies. The severest and penultimate epeirogenic pulse affecting the Boothia Uplift occured during latest Silurian and earliest Devonian time (Fig. X-1). During the prelude to, and then onset of, this critical pulse, the Barlow Inlet Formation was laid down on a broad, rapidly-subsiding carbonate shelf that covered much of the area now occupied by southern Cornwallis and Devon Islands. It was bounded to the north by the deeper-water sediments of the cape Phillips Formation, and in part to the south by a complex of alluvial fan and coastal plain fluviatile sediments of the Peel Sound Formation.

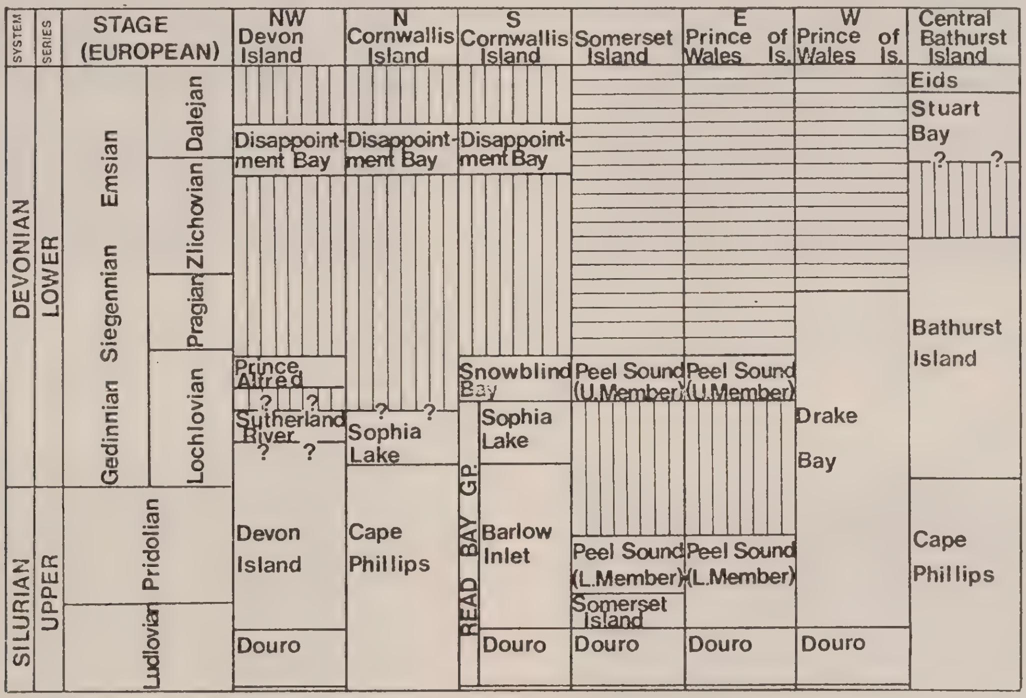


Figure X-1. Table of Formations: Formations discussed in the text include the Barlow Inlet Formation, the Douro Formation, the Somerset Island Formation, and the Sophia Lake Formation.

Preserved on this carbonate shelf is a very thick sequence of sediments representing marine environments ranging from peritidal to clinothem. In addition, the shelf was the site at various times of considerable in situ organic accumulations forming a variety of reef types in various paleogeographic positions on the shelf. The very thick accumulation of Upper Silurian shelf sediments must have required considerable platform subsidence. However the sequence represents an overall regression with several minor, overprinted deepening cycles, suggesting that on the whole deposition exceeded subsidence. The principal thrust of this project is the study of the complex facies mosaic resulting from the interplay of differential rates in sediment supply and production, uplift, and platform subsidence.

There is a paucity of previous work on the Barlow Inlet Formation despite the impressive thickness (1350m) of the shelf complex sediments. First formally designated by Thorsteinsson (1958) as the B and C members of the Road Bay Formation, the Barlow Inlet Formation's lithostratigraphic framework has remained generalized since this original work. Only two macropaleontological papers concerned with specimens from this thick sequence have been published. Papers that involve the Barlow Inlet Formation in regional correlation studies include Kerr and Thorsteinsson (1968), Gibling and Narbonne (1978), Mayr (1978) and Thorsteinsson and Uyeno (1980). Although the location of the type section has been defined (Thorsteinsson, 1958, p.65 ; Thorsteinsson and Uyeno, 1980, p.5), the type section itself has never been logged or described. Indeed, of the 1350m thickness, described stratigraphic sections have previously been available only for the basal 250m.

This report deals solely with the findings of the 1980 field season. The broad objectives of this field season were:

1. to complete stratigraphic sections in areas intermediate between sections previously studied, so as to provide closer control and better understanding of lateral lithofacies variations.
2. to examine correlative beds of the Barlow Inlet Formation on Griffith and Somerset Islands to gain some insight into facies trends to the south and east beyond the confines of Cornwallis Island.
3. to study the nature of the shelf margin where the Barlow Inlet Formation passess laterally into the Cape Phillips Formation.

As the Barlow Inlet Formation is incompletely exposed at most localities, there is sometimes little similarity or overlap between sections measured in adjacent areas. Therefore in this report, the contents are arranged such that each area containing one or more sections is treated separately, and a set of principal conclusions follows at the end. The sections studied in 1980 are located in Figure X-2 and are discussed sequentially from south to north in the text. The reader is referred to Kerr (1979), and figures therein, for a detailed discussion of the geological settings of the study area.

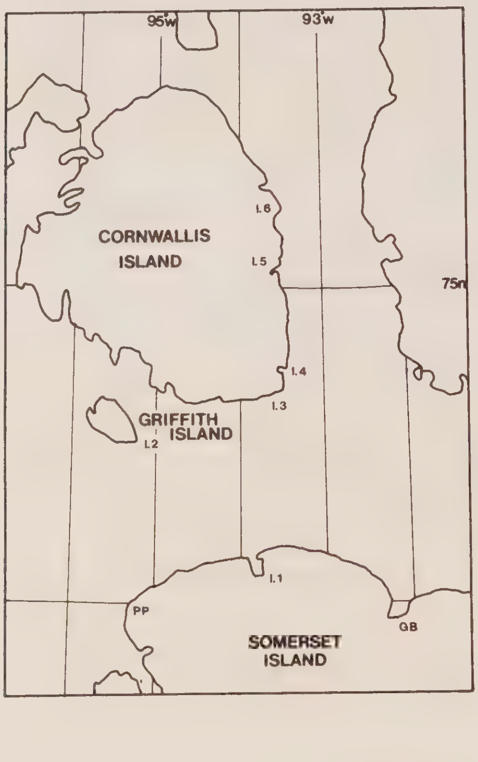


FIGURE X-2: Map showing the principal study localities. L1 - Cunningham Inlet, L2 - Cheyne Point (south-eastern Griffith Island), L3 - Cape Hotham, L4 - Barlow Inlet, L5 - Sophia Lake, L6 - Cape Rescue, PP - Pressure Point, GB - Garnier Bay.

CUNNINGHAM INLET AREA, NORTHERN SOMERSET ISLAND

EXPOSURE AND STRUCTURE

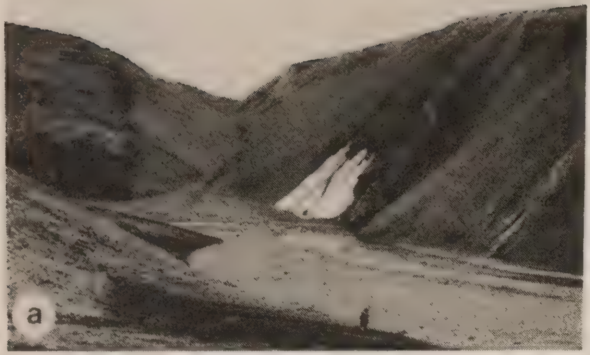
The Cunningham Inlet area is dominated physiographically by the Cunningham River Valley, a crescentic depression to the northeast which extends from the inlet to Garnier Bay further east on the north coast of Somerset Island. The geologic structure responsible for this feature, the Cunningham Inlet Fault Zone (Hopkins, 1971), was active during Eurekan Rifting (Kerr,1971). It consists of a graben striking west-northwest (Jones and Dixon, 1977), and numerous subsidiary small-scale high angle faults striking predominantly northwest (Fig. X-3 a,b).

Correlation between sections and construction of a composite lithostratigraphy for this area is made difficult by these faults, and as a consequence the relationship between sections A and B (Fig. X-4) is not certain. Exposure is relatively continuous along the steep sides of river gorges that dissect the plateau directly to the east of the inlet.

DESCRIPTION OF SECTIONS AND PALEOENVIROMENTAL ASSESSMENT

In section A (Fig. X-4), units a and b are argillaceous, in places well-laminated dolo/calcisiltite with a sparse fauna represented by thin lags of shell hash, and rarely by leperditiid ostracodes. Bedding planes commonly show multiple orders of desiccation cracks (Fig. X-3-e), indicating repeated subaerial exposure of depositional surfaces. Traction current structures are absent, as are indications of evaporite minerals, suggesting deposition in a low-energy, somewhat turbid tidal flat environment within the intertidal zone. Units c and d consist of alternating laminated dolo/calcisiltite and massive calcilutite lime mudstone. Such laminae can be attributed to a variety of physical sedimentation processes (see Reineck & Singh, 1975 p.105-107) or to biological activity (cryptalgal lamination). Research at present favours the latter process for the laminae developed within units c to d. The origin of the unfossiliferous massive calcilutite mudstone is not clear. However the lack of laminoid fenestrae is difficult to explain if these rocks were deposited in inter/supratidal environments. These units are presently interpreted as representing alternating low intertidal and very shallow subtidal environments, and may be incomplete shallowing-upward sequences of the low energy muddy type (James, 1977, fig.131). Units e to g each represent a more clearly defined cycle, or shallowing-upward event. Each regressive cycle commences with subtidally- deposited, rubbly mottled dolomitic limestone passing upwards into argillaceous limestone, then into plane-laminated dolo/calcisiltite. The latter two units represent depositional conditions of waning current velocity on the tidal mud flat. Unit h may represent a storm lag deposit occuping a tidal channel. It consists of a concentration of shelf-derived, sand-and rudite-sized crinoid grains.

Section B, (Fig. X-4) with few exceptions, is composed of rubbly argillaceous and mottled dolomitic carbonates. Units a to c contain common to abundant marine subtidal fossils including corrals such as solitary and ceratoid rugosans, auloporids, cylindrical favositids, *Coenites*, as well as leperditiid ostracode



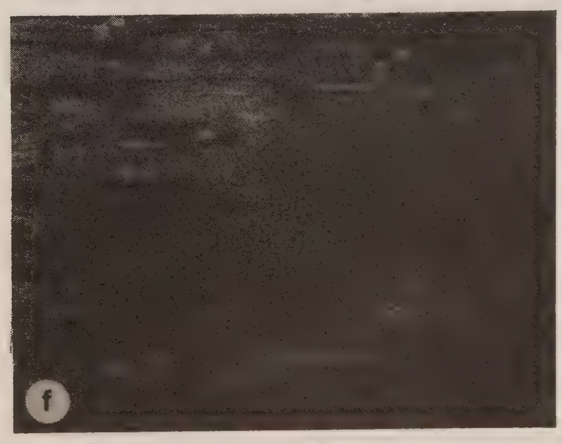
3-a: View to east-southeast on strike with fault bounding the north side of the Cunningham Inlet Graben.

3-b: Northwest-trending dip-slip faults are common. They are betrayed by offsets in drainage patterns. Correlation between sections is difficult because the throw on many of these faults is undetermined.

3-c: Rubbly-weathering *Atrypoidea*-bearing limestones stratigraphically above the first appearance of typical Somerset Island Formation (lower member) lithotypes. Canyon walls are 60m high.

3-d: Large (20m high) mounds in ?Douro Fm. Light areas are chiefly crinoidal packstone flank beds (note inclined bedding).

3-e: Two orders of desiccation cracks in intertidally-deposited sediments.



3-f: Plane Lamination passing upwards into lenticular-bedded ripple-cross laminated (transitional between in-phase and in-drift) calcisiltite of intertidal facies.

FIGURE X-3: Photographs taken at the Cunningham Inlet Section.

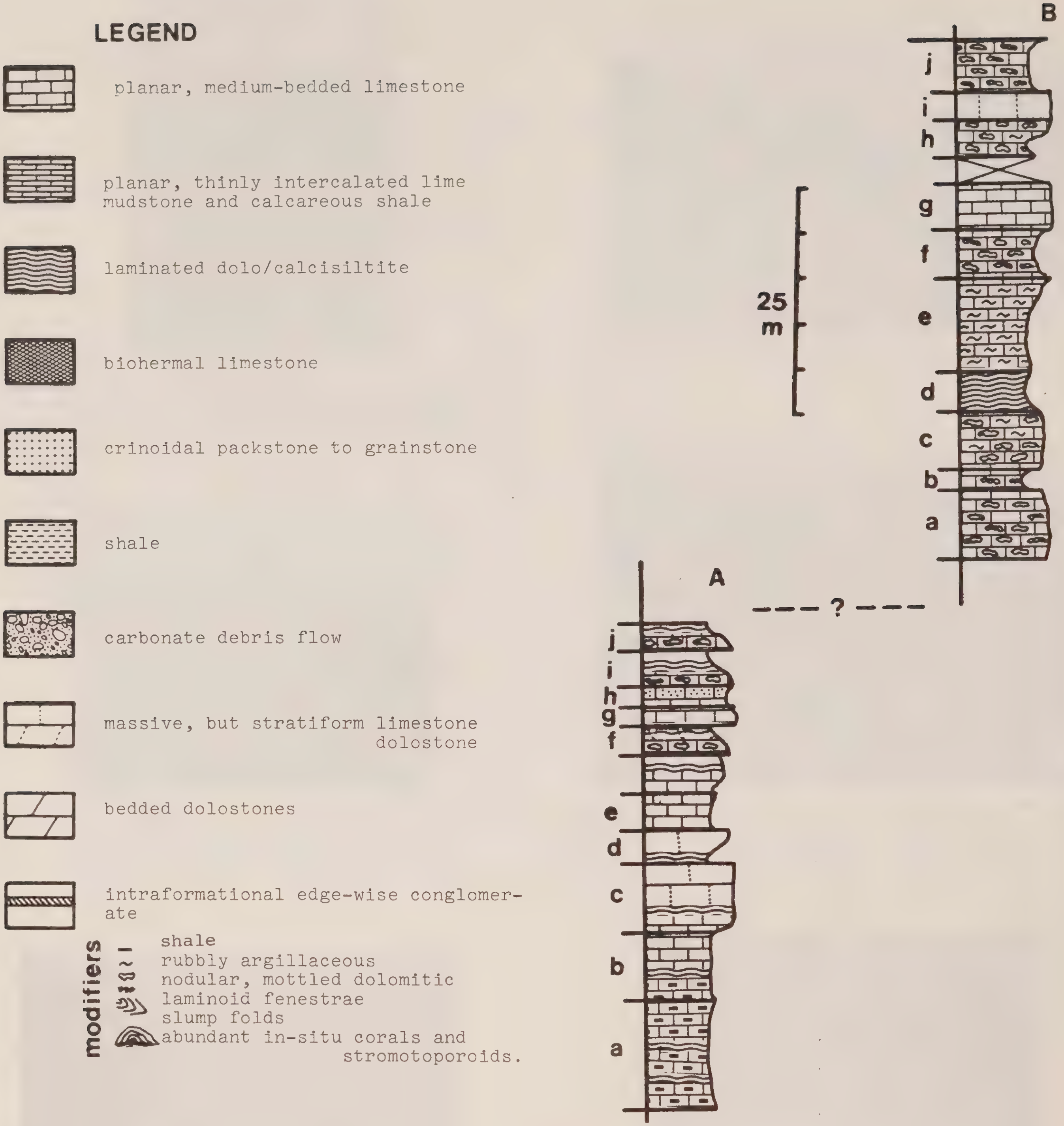


Figure X-4. Legend for stratigraphic columns shown in Figures X- 4 (right), 6, 7, 9, 11, and 14. Stratigraphic columns measured at section L1 (Fig. X-2) on Somerset Island, on right.

solenoporid algae, hemisperical stromatoporoids and the brachiopod *Atrypoidea*. *Atrypoidea* (Aff. *A. Phoca)* is present throughout the sequence. Unit d is laminated dolo/calcisiltite with no fossils but with abundant desiccation cracks. Unit i consists of massive, dark, brown-purple-weathering calcilutite mudstone, similar to units c and d of section A. Overall the sequence suggests deposition in predominantly stenohaline to slightly hypersaline shallow subtidal conditions with depositional surfaces periodically emergent.

DISCUSSION

Section A is apparently section 13 of Miall & Gibling (1978) and Miall, Gibling, & Kerr (1978). Section 13 was considered to lie entirely within the lower member of the Somerset Island Formation and has a thickness of 126m. The base of the lower member was defined as the base of the first planar stratified dolomite or limestone. The authors apparently did not recognize that the lower contact at section A/13 is in fact the fault that bounds the northern edge of the Cunningham Graben (Fig. X-3a). Thus section A/13 cannot yet be placed confidently within the lower member.

a: Oblique view of Cheyne Point showing formational boundaries and nature of exposure. Formations: 1. Cape Storm, 2. Douro, 3. Barlow Inlet and ?Somerset Island.

b: Strongly hematized joint surface. A prominent 120° set apparently served as a conduit for copper-bearing solutions as malachite occurs locally on some surfaces.

c: Imbricated mud clasts in a storm-generated intraformational conglomerate of the Doura Formation.

d: Asymmetric mega-ripples associated with intraformational conglomerate in the Doura Formation.

e: The largely covered, darker-colored interval between the low cliffs consists of argillaceous limestone of the lower member of the Barlow Inlet Formation. The Mud mounds of the uppermost part of the Douro Formation lie beneath the irregular contact.

FIGURE X-5: Photographs taken at the Griffith Island Study Section.

Furthermore the inclusion of the thick interval of rubbly-weathering (Fig. X-3c), *Altryoidea*-bearing argillaceous limestone (section B) within the lower member causes some problems in that its lithological affinities are closer to that of the underlying Douro Formation. Other difficulties arise in assigning the more than 75m of rubbly argillaceous and mottled, dolomitic, fossiliferous limestone that lie on the northern edge of the Cunningham Graben. Although resembling the Douro, these strata could be just another rubbly interval within the lower member of the Somerset Island Formation. Large reef structures (15m in stratigraphic height) within this interval (Fig. X-3d) are worthy of more detailed investigation.

CHEYNE POINT, SOUTHEASTERN GRIFFITH ISLAND EXPOSURE AND STRUCTURE

Virtually the entire Douro Formation is excellently exposed on seacliffs (700' vertical max.) at the southeast extremity of Griffith Island (Fig. X-5a). The beds dip 35° east, making the entire sequence accessible.

The principle structural features at Cheyne Point are a series of subparallel, near-vertical, east-striking dip-slip hinge faults. Their vertical displacements are as much as 30m, and dislocation of felsenmeer bands along these faults is excellently portrayed on airphotos (e.g. NAPL A1619A-117). Formational contacts are also conspicuous on airphotos. Associated with these faults is a very well-developed, west-northwest-striking joint set which appears to have acted as a conduit for copper-bearing fluids and iron-rich ground water (Fig. X-5b).

DESCRIPTION OF SECTION AND PALEOENVIRONMENTAL ASSESSMENT

The upper contact of the Cape Storm Formation is drawn at the top of a stromatoporoid boundstone (unit a) above beds of ripple cross-laminated, pale red dolosiltite (Fig. X-6). The succeeding covered interval is considered to mask the basal Douro Formation. Unit b, although somewhat variable in character, consists predominantly of rubbly argillaceous limestone with increasing amounts of argillaceous material and a more nodular-weathering appearance upsection. A typical diverse Douro Formation fauna is present in some abundance, with the brachiopod *Atrypoideaphoca* by far predominant. Other fossils include *Favosites, Gypidula, Fardenia,* solitary rugose corals and small hemispherical stromatoporoids. Commonly, more continuous calcisiltite layers within the rubbly argillaceous limestone have undulatory tops and planar bases and some are clearly plane-laminated (cross-lamination was not noted). This would suggest that the wavy tops do not represent megaripples; their origin remains enigmatic. There are no other primary structures indicative of current-influenced sedimentation. Coupled with the high clay content, this suggests deposition below normal wave base. Irregularly-spaced units of flat-pebble intraformational conglomerate, in places imbricate (Fig. X-5c), indicate periodic storm activity. In one unit, well-formed asymmetric megaripples with 10cm wave amplitudes are associated with an intraformational conglomeratic lens (Fig. X-5d).

Unit c is generally devoid of calcisiltite layers, has a low-diversity, low-abundance fauna of

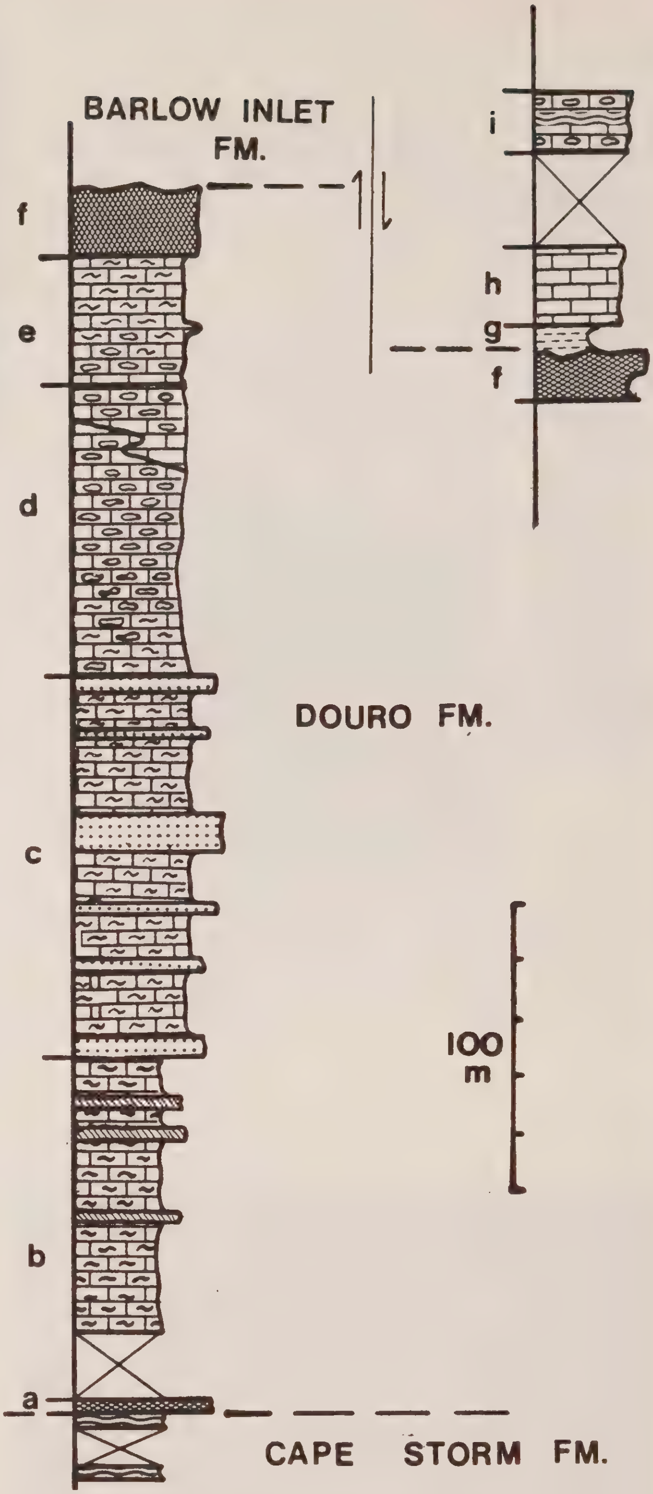


Figure X-6 Stratigraphic column for the section measured at Cheyne Point, Griffith Island.

Atrypoidea Phoca, crinoid stems and debris, solenoporid algae and bryozoans, and is decreasingly argillaceous upsection. It contains thick beds of variably dolomitized crinoidal grainstone to packstone. The paleoenvironmental interpretation of this interval is not certain. The nature of the overlying units would suggest that unit c signifies a gradual increase in water depth. Thick crinoidal units could indicate upslope buildups that provided sufficient bioclastic detritus to form debris aprons or wedges.

Unit d is composed of slightly mottled, argillaceous/dolomitic limestone almost devoid of body fossils, but commonly containing specimens of a large (1cm diam.) tubular trace fossil (aff. *Pilichnia)*. A single synsedimentary truncation surface was observed, indicating deposition on a paleoslope. The extensive bioturbation, but lack of a benthos, would suggest deposition in dysaerobic (0_2 depleted) conditions. Unit e represents shallowing and a return to conditions similar to those inferred for the base of unit c. Unit f consists of both a corral-rich biostrome and a sponge-coral mud mound. The abundant and diverse coral-stromatoporoid fauna is suggestive of shallower conditions, although the volume of calcilutite mud trapped within the mud mounds would suggest a low energy hydraulic regime.

The section continues in a down-faulted block on the southern end of the east coast of Griffith Island. The mud mound's upper surface is overlain by 12m of very argillaceous, dark grey limestone (unit g) that represents the lower member of the Barlow Inlet Formation (Fig. X-5e).

This is in turn succeeded by argillaceous, planar-bedded, dolomitic limestone (unit h) containing a few bedding planes rich in ostracodes, trilobites, and gastropods along with rare desiccation cracks. Unit h represents very shallow subtidal deposits. Unit i is a sequence changing rapidly upward from oncolitic, mottled carbonate through massive dolo/calcisiltite to well laminated unfossiliferous dolo/calcisiltite. The laminates are erosionally cut and overlain by an oncolite and corral rudstone that gradationally passes upward into mottled dolomitic limestone. This sequence is suggestive of rapid transition between shallow subtidal and intertidal deposition.

DISCUSSION

The lithofacies represented by unit d (deposition in dysaerobic conditions) has never been recorded previously in the Douro Formation. It does however corroborate a transgressive event that was recognized in different lithofacies of the Douro Formation on Cornwallis Island.

The presence of sponge-coral reefs at the very top of the Douro Formation may be correlated with similar buildups at the top of the Douro at Pressure Point on Somerset Island.

The lower member of the Barlow Inlet Formation at Cheyne Point is significantly different from its type section on Cornwallis Island. Firstly it is carbonate, not claystone, and secondly the presence of lenses of *Atrypoidea erebus* suggests that more normal marine conditions existed towards the west during the deposition of this member.

The planar-bedded nature of unit h, along with its restricted fauna and inferred bathymetry, suggest depositional environments with affinities to those of the lower member of the Somerset Island Formation, and the unit is possible a tongue of this formation.

CAPE HOTHAM AND CAPE DUNGENESS SOUTHEASTERN CORNWALLIS ISLAND

EXPOSURE AND STRUCTURE

Cape Hotham is the southerly terminus of the Cape Hotham Escarpment, a prominent cuesta-homoclinal ridge that is parallel to the eastern coast of Cornwallis Island for 50km or more. The escarpment is also parallel to the strong northerly trends of both fault traces and fold axes of the Cornwallis Fold Belt. The strata associated with the escarpment are on the eastern limb of the Cape Hotham Anticline and dip from 17° to 45° to the east. For most of its length the base of the escarpment marks the contact between the Lowe~ and Upper Members of the Barlow Inlet Formation.

At Cape Hotham, a major rockslide (see Thorsteinsson, 1958, p.19) has produced a sheer east-facing cliff (Fig. X-8h) some 200m high providing excellent exposure of the Barlow Inlet Formation (Fig. X-7). Somewhat less continuous exposures of the Douro and Somerset Island Formations lie in a small river gorge to the southwest near sealevel (Fig. X-8b; Fig. X-7). Cape Dungeness (Fig. X-8a) is a small butte formed by resistant dolomites of the Upper Member of the Barlow Inlet Formation overlying less resistant strata of Douro and Somerset Island Formations. Dips are a moderate 10° to the north. Cape Dungeness is situated approximatly 7km west-southwest of Cape Hotham (section A, Fig. X-7).

DESCRIPTION OF SECTION AND PALEOENVIRONMENTAL ASSESSMENT

In section A at Cape Dungeness (Fig. x-7) unit a is composed of planar-bedded, rhythmically-interbedded calcilutite and argillaceous calcilutite, with no other sedimentary structures, bioturbation or body fossils. Although the evidence is not conclusive, these strata resemble lithified periplatform hemipelagic oozes deposited on the shelf slope (see McIlreath and James, 1978). Unit b consists of rubbly argillaceous limestone typical of the Douro Formation. Fossils are abundant, in particular *Atrypoidea* and encrinurid trilobites. Units c and f are *Atrypoidea*- and *Encrinurus* - bearing, mottled dolomitic limestone with minor laminated dolo/calcisiltite showing desiccation cracks, medium-grained recrystallized limestone, and boundstone composed of stromatoporoids with irregular growth forms. These lithologies suggest a near-shore marine environment.

Unit h consists of laminated dolo/calcisiltite and massive calcilutite mudstone and is similar in environmental interpretation to units c and d of section A at Cunningham Inlet. Units i through k are largely units of dolomitized stromatoporoid boundstone that seem to be more biostromal than biohermal.

Unit a of section B (Cape Hotham, Fig. X-7) consists of planar to slightly rubbly, argillaceous, thin, evenly - bedded, sparsely fossiliferous calcilutite containing the trace fossil *Philichnia* (Fig. X-8d). Structures include hard-ground and truncation surfaces (Fig. X-8c). The latter are indicative of an original paleoslope, the former of periodic cessation of sedimentation coupled with submarine cementation. The unit is similar to unit d at Cheyne Point which is interpreted as a dysaerobic slope lithofacies. Units b and c are typical rubbly argillaceous limestone with a diverse and abundant fauna, dominated by *Atrypoidea* and *Encrinurus*. Units d

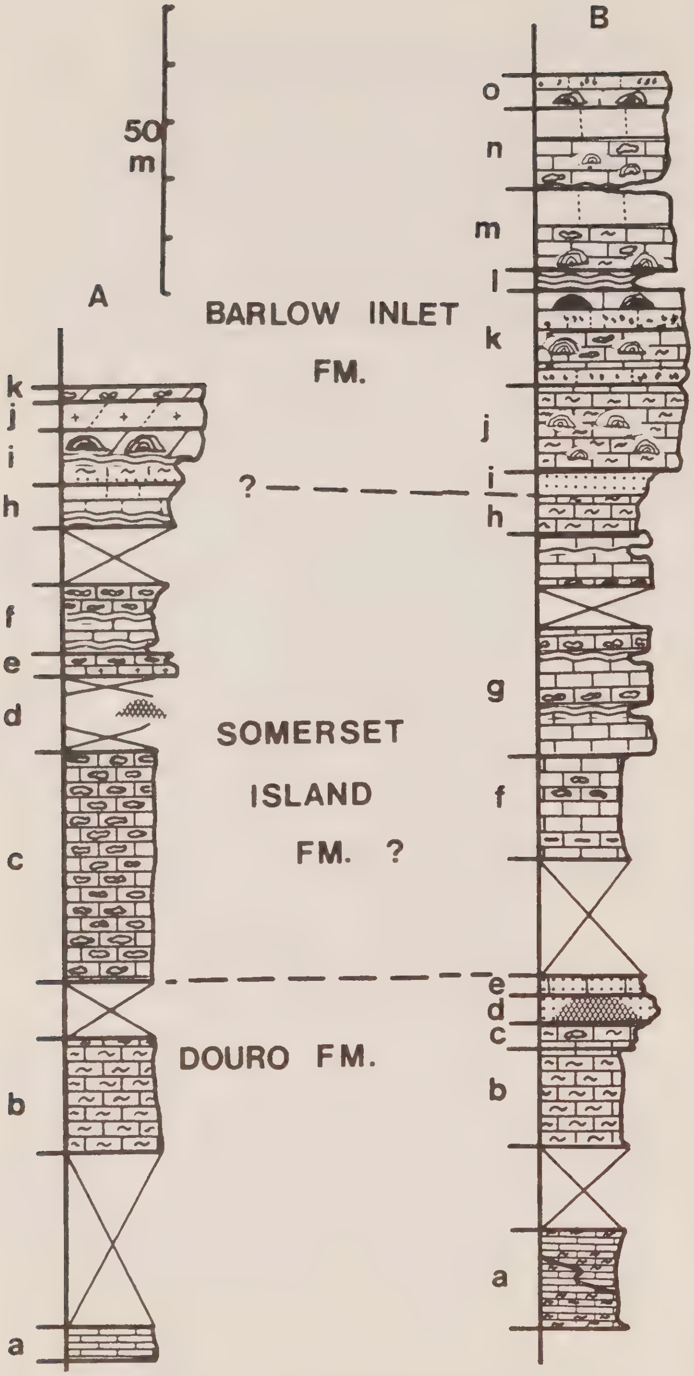


Figure X-7. Stratigraphic columns for the sections measured at Cape Dungeness and Cape Hotham

and e consist of a mud mound with a halo and cap of crinoidal wackestone and winnowed, cross-bedded grainstone, indicative of current-influenced (and presumably shallow water) deposition. Units f to h consist predominantly of shallowing-upward cycles that typically show the following sequence: erosional to abrupt base overlain by oncolitic, mottled dolomitic limestone (to) massive, unfossiliferous calicilutite mudstone (to) laminated dolo/calcisiltite with desiccation cracks (fig. X-8c). Also common in these units are thick beds of lenticular to wavy-bedded calcilutite intercalated with shale (Fig. X-8f). Units f to h are interpreted as shallow marine to intertidal deposits.

Unit i is a planar-crossbedded, crinoidal packstone which is overlain by a rubbly-weathering stromatoporoid-coral biostrome (unit j). Units k to o consist of regularly alternating coral-stromatoporoid biostromes, massive unfossiliferous calcilutite mudstone, and less commonly, laminated calci/dolosiltite. Contacts between all three lithologies tend to be abrupt (Fig. X-8g) and the individual units are laterally continuous (Fig. X-8H). The depositional environments range from shallow lagoonal to intertidal.

DISCUSSION

Unit b of both sections A and B are typical of the Douro Formation in lithology and fauna. Unit a represents a turbid shelf environment, whereas unit b is interpreted as a deeper-water slope facies.

The upper contact of the Douro Formation in section b is at the top of the mud mound interval. This interval may be coeval with similar mounds at the top of the Douro at Cheyne Point.

Units c to h of sections A and units f to h of section B are similar to the cyclic, shallow subtidal to intertidal sediments of the Lower Member of the Somerset Island Formation, and are herein assigned to that lithostratigraphic unit. The base of the Barlow Inlet Formation is drawn at the first crinoidal packstone/grainstone, or alternatively the first coral-stromatoporoid biostrome above the predominantly intertidal Somerset Island Formation.

The Lower Member of the Barlow Inlet Formation was not observed, and although rocks resembling it conceivably underlie covered intervals between units e and f and within unit g of sections B, the author feels this is unlikely in light of thickness trends of this member further north.

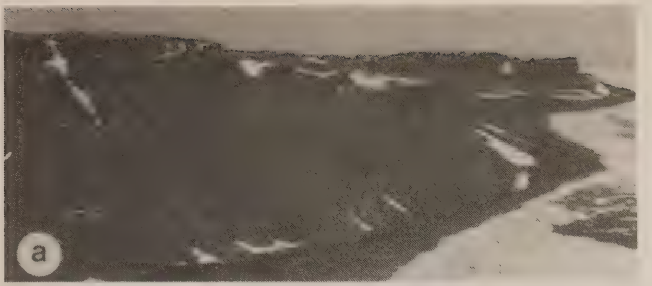
BARLOW INLET
EXPOSURE AND STRUCTURE

The Douro Formation and both members of the Barlow Inlet Formation are very well exposed in south facing cliffs on the north side of Barlow Inlet. Strata dip uniformly at 30^{o} to the east, making access to all units possible despite the sheerness of the cliffs. Apart from a strong east-trending joint set, no significant structure was seen in this homoclinal sequence.

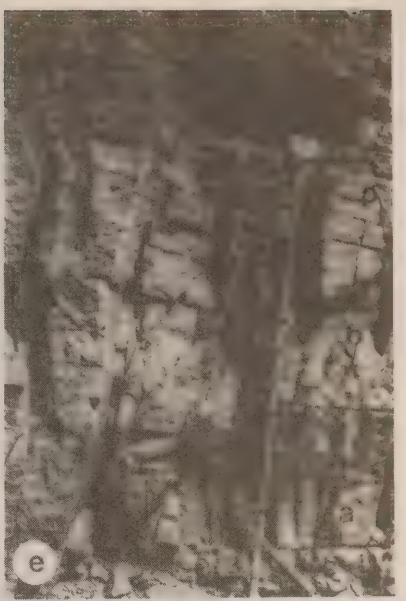
DESCRIPTION OF SECTION
AND PALEOENVIRONMENTAL ASSESSMENT

Unit a (Fig. X-9) consists of dominantly rubbly, argillaceous limestone with a diverse and abundant fauna indicative of normal marine conditions. Absence of traction-current structures and preponderance of fine-grained sediment suggest a calm-water setting. Perhaps this is attributable to deposition in an enclosed body at water depth to preclude active agitation at the sediment/water interface. Unit b consists of calcareous, graptolitic shale. This unit can be traced northward into the deep-water Cape Phillips Formation, and indeed can be considered a tongue of that formation. No sessile benthos is reported from unit b. The abrupt transition from units a to b reflects a rapid deepening.

Unit c consists predominantly of planar-bedded, rhythmically interbedded calcilutite and argillaceous seams, with rubbly argillaceous limestone randomly

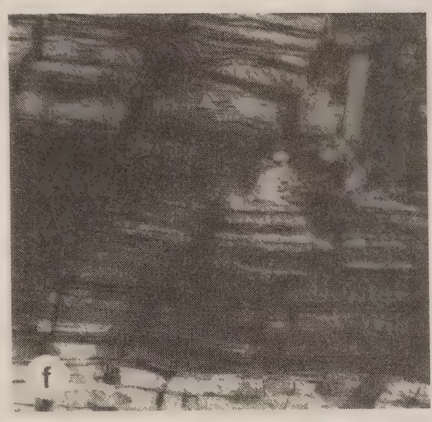


a: View east-northeast, Cape Dungeness in foreground, Cape Hotham and Cape Hotham Escarpment in background.



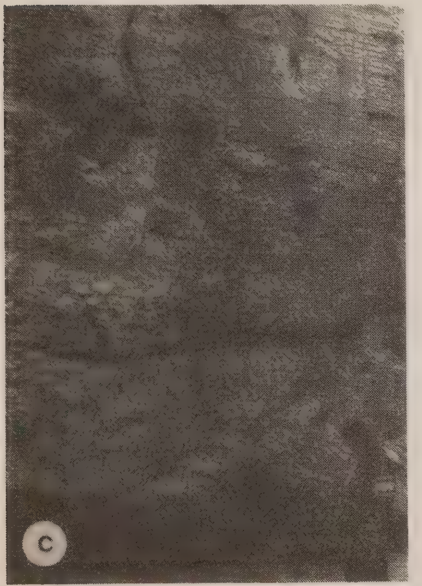
e: Tripartite cycle in Somerset Island Formation. A. oncolitic, mottled dolomitic limestone B. massive dolosiltite, C. laminated dolosiltite.

b: Formations at Cape Hotham, basal division - Douro; middle - Somerset Island; upper - Barlow Inlet Formation upper member (view north-northeast, elevation escarpment top +450m).



f: Planar to wavy-bedded, intercalated calcilutite and shale, Somerset Island Formation.

g: Stylolite between calcilutite mudstone and overlying stromatoporoid boundstone, Barlow Inlet Formation.



c: Synsedimentary truncation surface within Douro Formation.

h: Lateral continuity of alternating coral-stromatoporoid biostrome and massive calcilutite mudstone in Barlow Inlet Formation, 300m high cliffs.

d: Trace fossil *Pilichnis* in Douro Formation

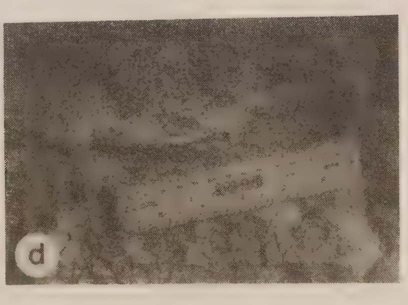


FIGURE X-8: Photographs taken at the Cape Hotham - Cape Dungeness Sections.

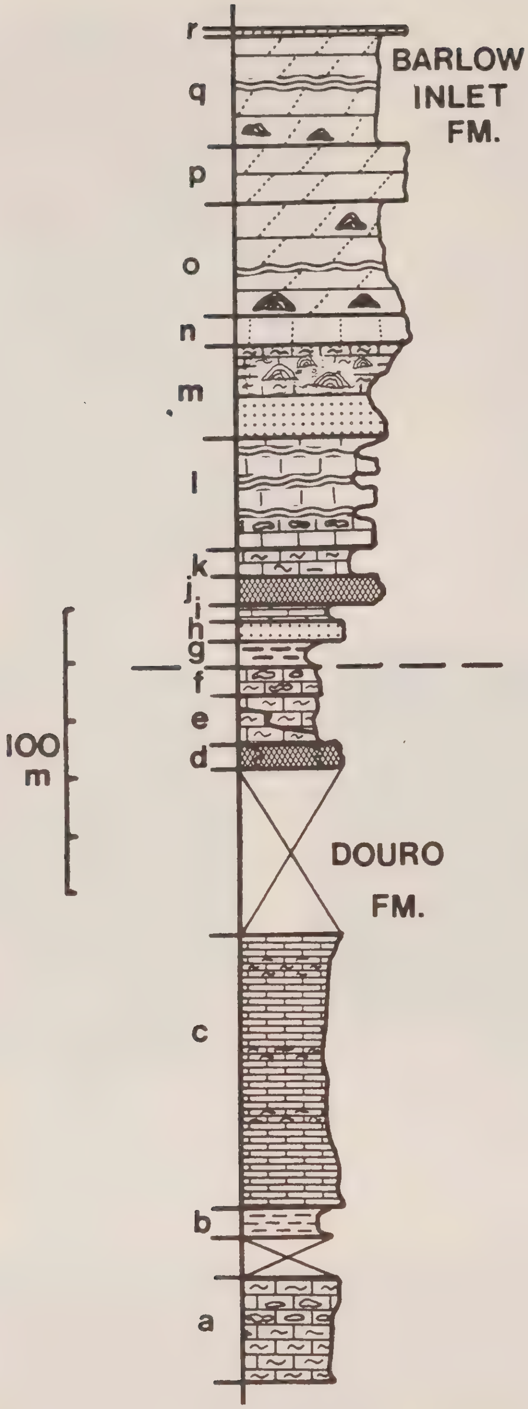


Figure X-9. Stratigraphic column for the section measured at Barlow Inlet.

throughout. The rubbly limestones may have originated in part through bioturbation. A monospecific trace fossil assemblage *(Pilichnia)* is present and may have been produced by specialized organisms (soft-bodied?) thatexploited the nutrient-rich substrate in periods of oxygen enrichment of the overlying water column. The substrate was never colonized by a sessile, shelly benthos (Fig. X-10a).

Units d to f were deposited on the slope as well, but with progressive O_2 enrichment upsection. Unit d consists of a mud mound populated by mucophyllid corals (Fig. X-10b). The mud mound may in fact be displaced from a position further upslope as is suggested by slump folds and contorted bedding in the enclosing sediments (Fig. X-10c). Truncation surfaces are common as well in unit e.

Unit f is mottled dolomitic limestone with a shallow marine benthos. Unit g, predominantly black shale with minor rippled, well-sorted medium-grained arkosic sandstone, was deposited in a relatively shallow, nearshore lagoon and remnant barrier bar complex that culminated the shallowing following transgressive deposition of graptolitic shale (unit b). A marine transgression resulted in the deposition of a complex of lithofacies (units h to k), including mud mounds, solenoporid - algae-crinoid grainstone, planar-bedded mudstone, and *Amphipora* wackestone. All are suggestive of relatively shallow subtidal marine environments. Unit l is similar to units f to h of the Cape Hotham section, and represents well-defined shallowing-upward cycles ranging from shallow subtidal to intertidal (Fig. X-10d). Unit m is the first rubbly-weathering (Fig. X-10e) coral-stromatoporoid biostrome which is underlain by crinoid wackestone to packstone. Units n to q are the dolomitized equivalents of the upper portion of the Cape Hotham section with alternating dololutite mudstone and biostromal beds. Unit r, the uppermost unit measured at Barlow Inlet, is the first recognizable crinoidal sediment to appear above the basal part of unit m.

DISCUSSION

The graptolitic shale (unit b) is equivalent in thickness to the correlative interval at Goodsir Creek, 12km to the north. In general the stratigraphy of the Douro Formation is similar at both locations, except that no bioturbated zones have been noted in the planar beds of the Douro of Goodsir Creek. This may reflect that at Barlow Inlet the sediments formed in conditions of improved oxygenation further up the paleoslope than those at Goodsir Creek.

The 9m-thick unit represents the most southerly exposure of the Lower Member of the Barlow Inlet Formation on the east coast of Cornwallis Island and indicates that the member pinches out to the south.

SOPHIA LAKE

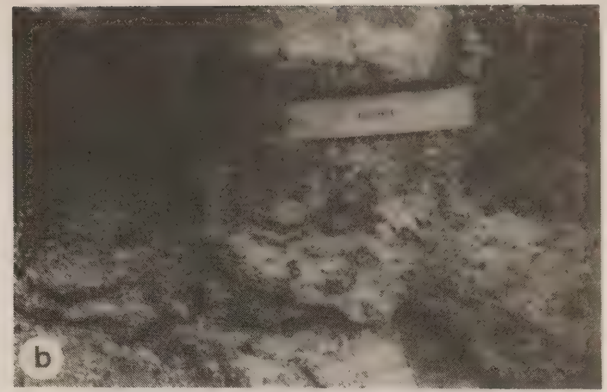
EXPOSURE AND STRUCTURE

Good but stratigraphically discontinuous exposure lie along the valley of the river flowing eastward into Sophia Lake (Fig. X-12a). Strata dip approximately 20° east and exposures are generally accessible. Roughly 20% of the total stratigraphic thickness is exposed. No significant structures were observed within this homoclinal sequence.

DESCRIPTION OF SECTION AND PALEOENVIRONMENTAL ASSESSMENT

Unit a of Figure X-11 consists of planar, rhythmically-bedded calcilutite with no benthos. An interesting trace fossil assemblage including *Phycodes* and *Sinusites* is present rarely on bedding planes. This unit represents deep water anaerobic deposition and can be correlated in part, with member C of the Cape Phillips Formation. Unit b has a diverse normal marine benthos including solitary rugose corals, favositid corals, *Gypidula, Atrypoidea,* crinoids, strophomenid brachiopods, and auloporid corals. The enclosing lithology is a slightly mottled dolomitic

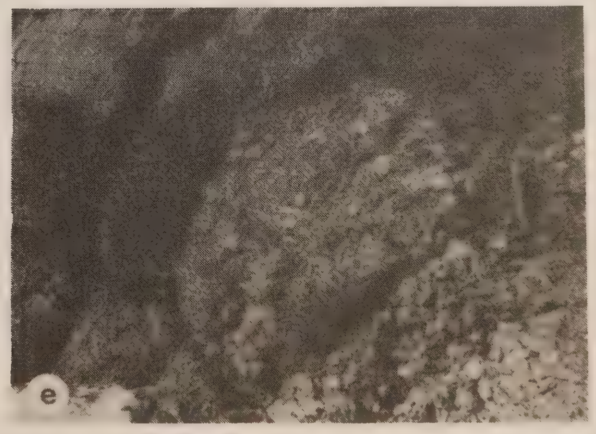
a: Planar-bedded, rhythmically-intercalated, unfossiliferous lime mudstone and calcareous shale underlain by rubbly argillaceous limestone. (Douro Formation).



b: Transported block of mucophyllid-rich (solitary rugose coral), lime-mud boundstone in the Douro Formation.

d: Cyclically deposited intertidal-shallow-subtidal sediments, capped by a massive, dolomitized biostrome. (Barlow Inlet Formation, view covers 70m of vertical cliff)

c: Slump folds associated with exotic boundstone (Douro Formation).



e: Rubbly-weathering biostrom with an in situ fauna of hemispherical to subspherical tabulate corals and stromatoporoids (Barlow Inlet Formation).

FIGURE X-10: Barlow Inlet Study Locality

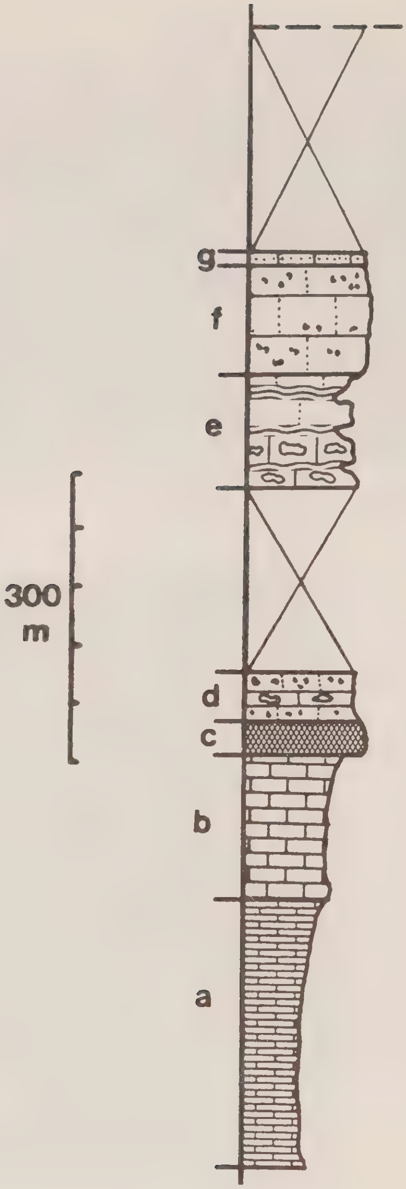


Figure X-11. Generalized stratigraphic section for Sophia Lake: Barlow Inlet Formation upper member.

limestone. Unit c is a buildup complex showing strong vertical zonation (Fig. X-12d). The upward stratigraphic sequence comprises: a) a basal crinoidal packstone, b) a wackstone whose major constituents include solitary and fasciculate rugose corals and tabulate corals, and c) a hemispherical favositid coral and stromatoporoid framestone biostrome, and d) a stromatoporoid framework reef core. The reef is capped by enigmatic massive lime mudstone whose environmental origins are not presently understood. Unit f is dominated by fossiliferous calcilutite mudstone of unknown affinities and/or origins. Intervals of unit f are composed rarely of a rudstone of large dolomite-replaced, bivalve shells (cf. *Megalomoides)* (Fig. X-12c). Unit g is composed of crinoidal wackestone with a normal marine fauna.

DISCUSSION

The basal 450m of the Sophia Lake section is strikingly similar to the equivalent stratigraphic interval at the type section for the Upper Member of the Barlow Inlet Formation at Read Bay, 25 km to the south. Until such time as the origin of the thick stratiform, massive calcilutite mudstone beds is deciphered, an appropriate sedimentation model for the upper half of this section cannot be applied. Of further interest is that the graphic measurements suggest a 20% decrease in total thickness of the Upper Member from Read Bay to Sophia Lake. This is somewhat speculative and is based on a presumed location (albeit well-estimated) for the Barlow Inlet- Sophia Lake Formation contact.

CAPE RESCUE

EXPOSURE AND STRUCTURE

The Cape Rescue study area encompasses some 25 square km with scattered exposures in coastal cliffs or along river gorges. Structural attitudes of the beds vary considerably, although in general the beds strike north & dip gently (7^{o}-19^{o}) to the east. Small, high-angle dip-slip faults are very numerous (Fig. X-13b), but no major dislocations were observed, nor were any suggested from the composite stratigraphy.

In the Cape Rescue area the contact between the Cape Phillips Formation and the Barlow Inlet Formation is somewhat diffuse and its placement is therefore subject to interpretation. The inability to accurately place sections stratigraphically reflects both the discontinuity of outcrop and the ambiguity of lithological affinities between the two formations.

DESCRIPTION OF SECTION

Seven sections were measured at Cape Rescue of which two are discussed below.

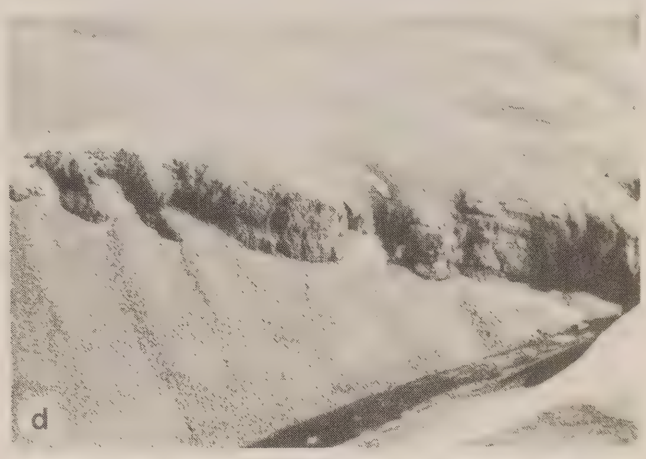
Section A described in Figure X-14a is a coastal exposure 2.5km southeast of Helen Haven (Fig. X-13d) & is the most northerly outcrop of the Barlow Inlet Formation on Cornwallis Island. Unit a consists of planar to slightly wavy, medium-bedded grey-brown-weathering limestone with a sparse fauna of orthoconic nautiloids and favositid corals. The sparse fauna and lack of transaction current structures suggest a calm, perhaps deep-water environment. Similar rocks in adjacent areas have been mapped as the Cape Phillips Formation. Unit b is a crinoidal grainstone to packstone. Although several origins can be postulated for thick sequences of encrinites, the most probable for units c to f is that of fore-reef talus beds accumulating downslope from a buildup. Holdfast -rich mudmounds are commonly spatially associated with encrinite accumulations (Fig. X-13a-d). Another common lithotype is intraclastic, crinoid-rich inter-formational breccia (Fig. X-13f). The probable mechanism for sedimentation of this coarse-grained phase is submarine debris flow. Some depositional surfaces remained relatively stable for longer periods and were colonized by crinozoans (Fig. X-13e). Thus, at least in part, the arenite to rudite-sized crinoidal material was locally derived on the slope. Unit h represents an extensive debris flow and unit i contains large lime-mud mounds that may have developed in situ, but are more likely to be larger talus blocks derived from buildups further upslope.

A variety of buildup types formed as discontinuous organic growth centres at the transition between the Barlow Inlet and Cape Phillips Formations. Two extremes are 1) enigmatic sponge mud mounds that grew well down the paleoslope (Fig. X-15d, and 2) large, faunally-complex framestone buildups that apparently grew above wavebase, as is indicated by

a: View to east-northeast along creek flowing into the western end of Sophia Lake. Contact between the upper member of the Barlow Inlet Formation (1) and the Sophia Lake Formation (2) is dashed.

b: Laminated, wavy to planar-bedded calcisiltite.

c: Massive lime mudstone with shells of a large bivalve (*Megalomoides*?).



d: Unit c the principal carbonate buildup at Sophia Lake.

FIGURE X-12: Photographs taken at Sophia Lake Locality.

their extensive and winnowed flank- bed development (Fig. X-13-2). The latter reef type is usually dolomitized and commonly acts as a trap for mineralizing fluids as marcasite is found locally at the inland river gorge exposure.

Section B is a (Fig. X-14B) monotonous sequence composed mainly of lime mudstone, and is largely unfossilliferous. It changes but appreciably stratigraphically upward in the section. The basal units (a and b) have no body fossils, but rarely bedding planes show *Phycodes*, a trace fossil (Fig. X-15c). Bedding is thin, even and planar (Fig. X-15a). Unit c is a thin bed of crinoidal wackestone to packstone. Units d and e are similar to units a and b, but have slightly wavier bedding contacts, bedding is thicker and less uniform, and the rock locally has a slight mottled appearance. Towards the top these beds contain a sparse fauna of *Hemiarges*, *Atrypoidea*, rhychonellid and strophomenid brachiopods and disarticulated crinoid pelma. The overall section suggests a gradual upward shallowing of the depositional environment.

DISCUSSION

Distinguishing between rocks mapped as the Cape Phillips Formation (Thorsteinsson,1973) and the basal lithofacies of the Upper Member Of the Barlow Inlet Formation in the Cape Rescue area is not possible on an outcrop scale. This suggests that the shelf-slope transition was very gradual, with only sparse and discontinuous buildups at the shelf margin. At least for the lower portion of the Upper Member, it is likely that the bathymetric configuration more likely closely resembled that of a carbonate ramp, rather than that of a platform.

The vertical sequence of strata generalized in section A of Figure X-14 closely resembles that for a depositional margin of a shallow water reef as proposed by by McIlreath and James (1978). It is, however, the authors' opinion that section A represents a local, organically-produced topographic high, and not an extensive shelf-edge reef complex.

a: Internally-differentiated carbonate buildup (25m in height).

b: Marcasite mineralization infilling vuggy dolomite along fracture planes.

c: Parallel grooves on bedding plane indicating syn-sedimentary down-slope mass movement of overlying strata.

d: Oblique view of northernmost exposure of the Barlow Inlet Formation. A. mucophyllid-crinoid mud mounds, B. fore-reef talus slope.

e: Crinozoan holdfast. Colonization of stabilized fore-slope talus beds.

f: Intraformational breccia with peri-platform mud clasts in a crinoid wackestone matrix.

FIGURE X-13: Photographs taken at Cape Rescue - Section A.

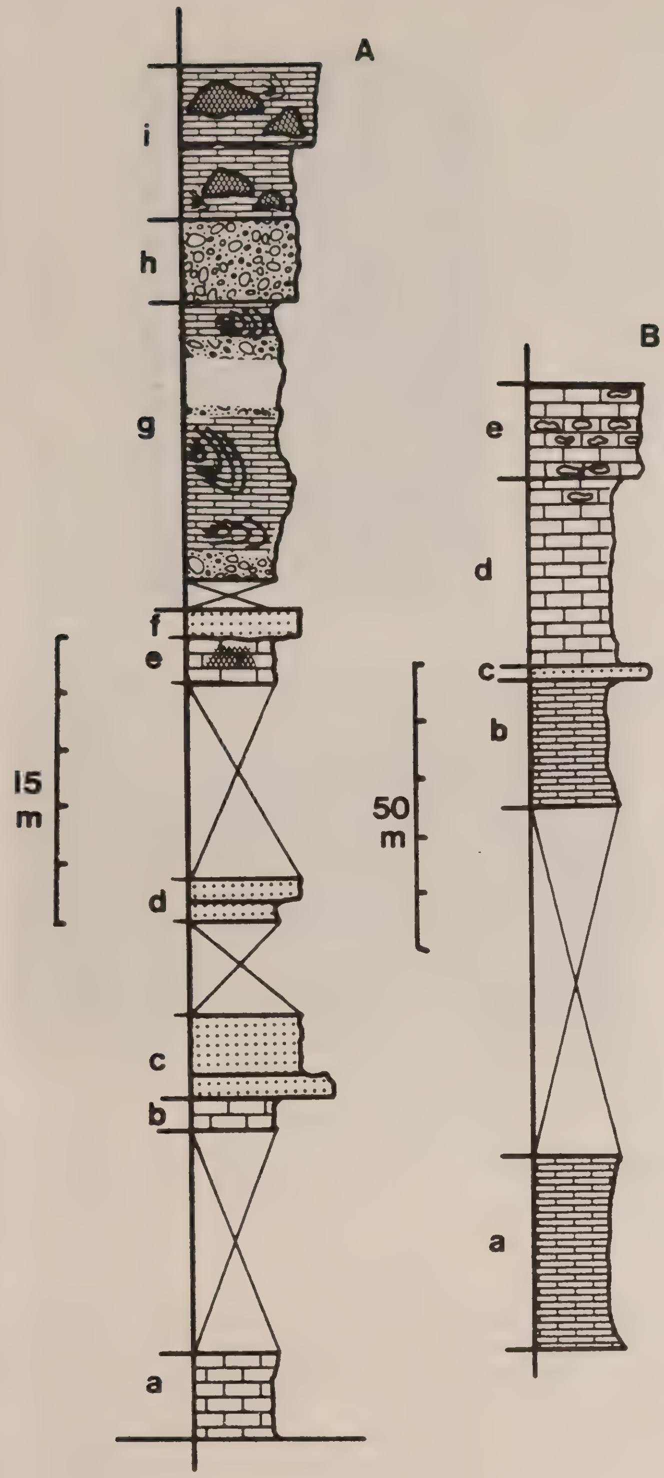


Figure X-14. Generalized stratigraphic column for the upper member of the Barlow Inlet Formation measured in the Cape Rescue area.

CONCLUSIONS

The principal conclusions drawn from the 1980 field studies are as follows:

1. The shelf-edge transition was gradual; largely a carbonate ramp with local reef and shoal development.
2. A thick, previously unrecognized facies of the Douro Formation on Griffith Island and on the southeast corner of Cornwallis Island is composed of rubbly argillaceous limestone grading into thin planar-bedded lime mudstone intercalated with calcareous shale. It is virtually devoid of body fossils, but locally is extensively bioturbated. This lithofacies appears to be transitional between deep slope and shelf.
3. Lithological equivalents of the Somerset Island Formation occur between the Douro Formation and the Upper Member of the Barlow Inlet Formation on SE Cornwallis Island and on Griffith Island.
4. The Lower Island Formation occurs between the Douro Formation and the Upper Member of the Barlow Inlet Formation on SE Cornwallis Island and on Griffith Island.
4. The Lower Member of the Barlow Inlet Formation is 9m thick at Barlow Inlet, but it is not exposed further south on the east coast. The monograptid -bearing beds reported by numerous workers from the Douro Formation at Goodsir Creek are also present at Barlow Inlet.
5. Mud mounds and other carbonate buildups of diverse morphology and makeup formed within all stratigraphic intervals of the Upper Member of the Barlow Inlet Formation.
6. Malachite coats some joint surfaces within the Douro Formation on Griffith Island. Small blebs of sphalerite scattered in the Cape Phillips Formation and the basal portions of the Upper Member of the Barlow Inlet Formation are invariably associated with late hydrothermal, fracture-filling dolomite. Marcasite fills open pore spaces and fractures within the dolomitized reef complex of the Barlow Inlet Formation Upper Member in the Cape Rescue Area.

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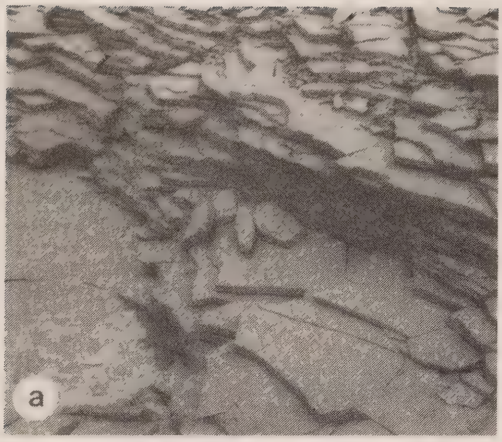

a: Planar, rhythmically-bedded lime mudstones of section B.

b: Minor parallel dip-slip faults cutting beds of section B.

c: *Phycodes-Palaeophycus* Trace fossil assemblage.

d: Five discrete outcrops of $\pm$15 meter-high lime mud sponge? mounds.

FIGURE X-15: Photographs taken at Cape Phillip (?) Formation shown in a, b and c.

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GEOLOGICAL STUDIES OF RARE-ELEMENT PEGMATITES IN THE YELLOWKNIFE BASIN OF THE N.W.T.

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INTRODUCTION

In May, 1980, a field and laboratory project was begun to study the petrology, mineralogy, paragenesis and structural relationships of pegmatites and intrusions in the Yellowknife pegmatite field. The pegmatites of this area are known for their content of rare elements such as tantalum, columbium, beryllium, lithium, niobium, phosphorus and tin.

In this report, the petrology and mineralogy of the pegmatites and intrusions in the southeast part of the Yellowknife pegmatite field are described. Tables are included that summarize the modal composition of the granitoid intrusions and mineral abundances of the examined pegmatites. Structure and zoning of the pegmatites are discussed, and a tentative genetic interpretation is outlined. More detailed information is anticipated as the program continues.

Chemical analyses are incomplete due to failure of laboratory equipment. This data will be submitted in a complement to this report as soon as they are available. In addition, a microprobe study of opaque minerals is planned.

FIELD WORK

Field work in 1980 covered the southeastern part of the Yellowknife pegmatite field, which is that area between Hearne Channel of Great Slave Lake and Campbell and Francois Lakes. This represents approximately one-third of the pegmatite field. The remainder will be covered as the project continues.

Six granitoid plutons which outcrop within reasonable distances of the pegmatites studied were sampled, although coverage of two plutons in the vicinity of Tumpline Lake was incomplete. About 34 pegmatites were sampled, the actual number would vary with the definition of a discrete pegmatite. A total of about 500 granitoid and pegmatite samples were collected, of which 220 (Tables XI-I and XI-II) were selected for laboratory study.

PLUTONIC GRANITOIDS

FAULKNER LAKE BIOTITE LEUCOTONALITE (TRONDHJEMITE)

The Faulkner Lake pluton is a massive, medium-grained biotite (locally hornblende) granodiorite (Henderson, 1976) which forms an ellipsoidal body trending 023° between Faulkner and Drever Lakes It is 10.3 km long and 1.4 km wide at its widest point (Fig. XI-II).

In hand specimens, the medium-grained rock shows euhedral to anhedral feldspar grains varying in color from pale reddish brown to moderate orange pink to white with clear anhedral quartz grains. Zoning of the plagioclase is visible where white rims surround pink interiors. The mafic mineral, black biotite in flakes up to 3-4 mm across, appears greenish black where altered to chlorite.

The typical rock is estimated (Table XI-I) to consist of 29% quartz, 3% microcline, 61% oligoclase (An 11), 7% biotite, and traces of apatite and zircon. The rock is inequigranular with grains ranging from 0.1 mm up to 7mm and is xenomorphic with a small and variable degree of mortar texture. The mortar consists of a fine-grained mixture of quartz and feldspar surrounding recrystallized grains.

Anorthite content of the rims of the distinctively zoned plagioclase crystals and of the second-generation grains ranges from 9 to 14 An%. The cores of the plagioclase are partly altered to sericite, clay minerals, and traces of clinozoisite. In all cases, the cores have distinctive euhedral outlines compared to the subhedral to anhedral rims of second-generation albite-oligoclase. Carlsbad, albite and pericline twinning is common, as is myrmekite where the oligoclase is adjacent to microcline.

Cross-hatched microcline forms a few anhedral grains, but is common in the interstitial 'mortar'. Large quartz grains have mosaic texture, undulatory extinction and sutured boundaries. Anhedral to subhedral grains of light to dark brown biotite commonly exhibit a shredded appearance. The biotite is locally altered to penninite and, in two samples, the conversion to light or medium-green clinochlore is essentially complete.

Apatite is present in trace amounts as subhedral, generally rounded grains. Minute zircons are seen in biotite and are distinguished by pleochroic haloes.

BUCKHAM LAKE BIOTITE-MUSCOVITE LEUCOGRANITE

The Buckham Lake pluton is part of Hendersons' (1976) Unit 11, which he describes as a massive, medium-grained biotite-muscovite adamellite with abundant pegmatite. The body is on the northeast side of Buckham Lake, is roughly ellipsoidal, and measures 4.8 km by 4.0 km (Fig. XI-III).

In hand specimen, the Buckham Lake granitoid is generally a medium-grained rock distinguished by light red to pale pink to white, euhedral to subhedral feldspar, clear quartz, and distinctive silvery-gray to dark gray books of muscovite as much as 1 cm across. A few flakes of black biotite are visible. A fine-grained sample exhibits fine flakes of biotite, but no muscovite. Some biotite flakes have a dark green cast caused by alteration to chlorite.

Microscope examination shows average composition is 35% quartz, 25% microcline, 27% albite (An 7), 3% biotite, 11% muscovite and traces of apatite, zircon, and opaques that are largely alteration products. Composition of particular samples varied from muscovite microcline-albite leucogranite to muscovite leucogranodiorite.

Though basically medium-grained, grain size of samples varies from 0.1 mm to 7.0 mm. The texture of the rock is predominantly xenomorphic to hypidiomorphic, inequigranular with varying amounts of a fine-grained mixture of quartz and feldspar interstitial to the large grains. Microcline is the predominant alkali feldspar except in one specimen which contains a sodic albite (An 3). The microcline shows distinct cross-hatching and is commonly perthitic (patches and strings). Albite/ oligclase (An 5-14) is present as subhedral crystals with irregular rims. Large crystals commonly are twinned according to the Carlsbad law and albite and percline twinning is well developed in most grains.

FIGURE XI-1: Map showing granitoid plutons and pegmatite series, swarms and bodies discussed in this report. Geological base from J.B. Henderson, 1976.

Table XI-1: Semiquantitative modes of the plutonic granitoids

Pluton	Sample no.	Quartz	Potassic feldspar	Plagioclase (An content)	Biotite*	Muscovite	Apatite	Zircon	Titanite	Epidote	Oxides	Amphibole	Miscellaneous
Faulkner Lake biotite leucotonalite													
	FGR-1	23	5	67(12)	5c	-	tr	tr	-	-	-	-	+ clinozoisite
	FGR-14	25	3	65(9)	7c	-	tr	tr	-	-	-	-	
	FGR-18	22	3	65(11)	10c	-	-	-	-	-	-	-	
	FGR-24	24	2	69(9)	5c	-	-	tr	-	-	-	-	
	FGR-27	37	3	53(12)	7c	-	tr	tr	-	tr	-	-	+ clinozoisite
	FGR-30	45	3	42(14)	10c	-	tr	tr	tr	-	-	-	+ clinozoisite
	FGR-37	27	3	65(12)	5c	-	tr	tr	-	-	-	-	+ clinozoisite
Buckham Lake biotite-muscovite leucogranite													
	BGR-1	30	15	49(3)	-	4	1	-	-	-	tr	-	
	BGR-8	25	30	35(6)	-	10	tr	-	-	-	tr	-	
	BGR-11	30	22	33(6)	2	13	tr	tr	-	-	tr	-	
	BGR-16	42	25	25(14)	8c	-	tr	tr	-	-	-	-	
	BGR-21	40	20	30(5)	trc	10	-	-	-	-	-	-	
	BGR-23	32	15	35(7)	3c	15	tr	-	-	-	tr	-	
	BGR-24	35	15	30(9)	5c	15	tr	-	-	-	-	-	
	BGR-26	40	10	30(7)	-	20	tr	-	-	-	tr	-	
	BGR-35	40	20	26(7)	4c	10	-	-	-	-	-	-	
Doubling Lake biotite leucogranodiorite													
	DGR-1	33	15	50(13)	2c	-	-	tr	tr	-	-	-	+ clinozoisite
	DGR-3	20	15	62(9)	1c	1	tr	-	tr	1	tr	-	
	DGR-4	35	5	54(12)	5	-	-	tr	1	tr	tr	-	
	DGR-6	25	6	65(13)	3c	-	tr	-	tr	tr	tr	-	
Eastern biotite granite													
	EGR-1	29	35	29(10)	7	tr	tr	tr	-	-	-	-	
	EGR-3	22	36	36(11)	6c	tr	tr	tr	tr	-	tr	-	
	EGR-6	31	32	32(13)	5c	tr	tr	tr	-	-	tr	-	
Tumpline Lake biotite leucotonalite													
	TU-NE-1	35	15	45(14)	5	-	tr	-	tr	tr	-	-	+ allanite?
	TU-NE-3	27	18	53(nd)	2c	tr	tr	-	-	tr	tr	-	
	TU-NE-4	29	2	58(nd)	7c	-	tr	-	1	3	tr	tr	
	TU-NE-5	26	1	65(nd)	5c	-	-	-	1	2	tr	-	
	TU-NE-6	22	5	65(16)	8c	-	tr	-	tr	tr	tr	-	
	TU-NE-7	26	5	66(nd)	3c	-	-	tr	tr	tr	-	-	
	TU-NE-8	30	-	60(13)	10c	-	tr	tr	tr	4	tr	tr	+ clinozoisite
	TU-NE-9	29	2	59(nd)	7c	-	tr	tr	tr	3	tr	-	
	TU-NE-10	27	5	53(14)	11c	-	tr	tr	-	2	tr	1	
Tumpline Lake biotite-muscovite granite													
	TU-SW-1	20	20	40(nd)	5c	15	tr	tr	tr	-	-	-	+ clinozoisite
	TU-SW-2	35	28.5	28.5(9)	1	7	tr	-	-	-	-	-	
	TU-SW-3	27	27	34(nd)	10c	3	tr	tr	-	-	-	-	
	TU-SW-4	30	25	36(10)	5c	4	tr	-	-	-	-	-	
	TU-SW-7	25	37	18(8)	10c	10	tr	tr	-	-	-	-	

Notes: *c = partial to complete alteration to clinochlore (penninite)   nd = not determined   - = not observed   tr = trace

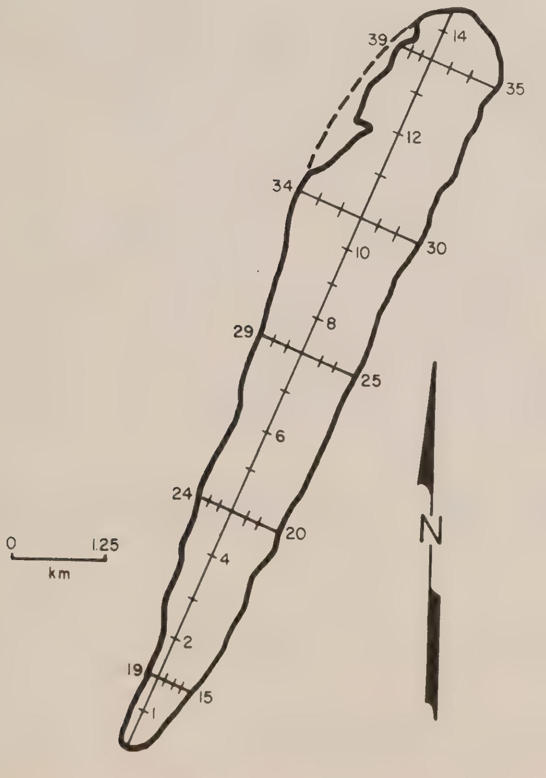


FIGURE XI-2: Faulkner Lake biotite leucotonalite pluton with sampling grid.

Sericite of varying sizes appears as an alteration along with trace amounts of calcite.

Muscovite appears to have formed at the expense of microcline, commonly forming rims around the microcline. In certain cases (eg. BGR-1, -8), the muscovite contains minute hematite grains possibly representing iron from previous biotite and, in some such cases, muscovite is intergrown with biotite. The content of light to dark brown biotite is variable with the greatest amounts apparently in rocks near the contact with the metasediments. The albite granite is an exception. Biotite is shreddy and is partly altered to penninite. Trace amounts of small subhedral apatite is present in addition to rare zircon with pleochroic haloes.

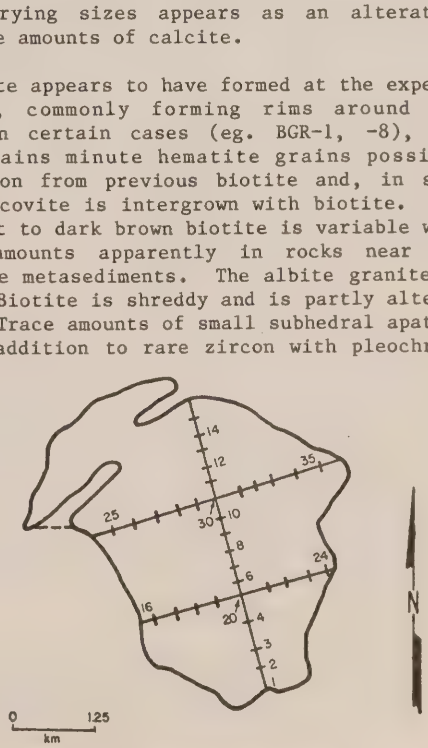
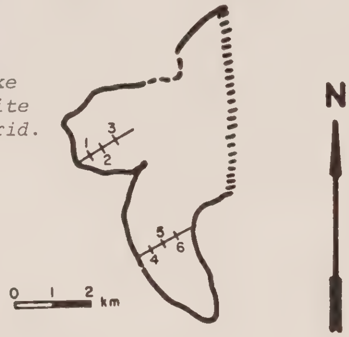


FIGURE XI-3: Buckham Lake biotite-muscovite leucogranite pluton with sampling grid.

DOUBLING LAKE BIOTITE LEUCOGRANODIORITE

Henderson (1976) considers the Doubling Lake pluton to be part of Unit 9, massive, medium-grained biotite (locally hornblende) granodiorite. The pluton outcrops as a uniform bilobate section extending 6.5 km northwest and up to 3.1 km to the northeast where it is separated by a fault from mafic volcanic units and a probable continuation of the granitoid body to the northwest. Sampling was conducted by northeasterly directed traverses on both lobes (Fig. X1).

FIGURE XI-4: Doubling Lake biotite leucogranodiorite pluton with sampling grid.



Most of the medium-grained granitoid is a moderate orange-pink colour with euhedral to anhedral feldspar. Under a hand lens, white rims are visible around the plagioclase. The anhedral quartz is clear. Black biotite or a greenish-black chlorite forms plates as much as 7 mm across that is rarely associated with minute grains of a black opaque mineral (ilmenite?).

Based on estimations of the composition of four samples, this hololeucocratic granitoid is composed of 28% quartz, 10% microcline, 58% oligoclase (An 12), 3% biotite, and traces of apatite, zircon, titantite, epidote, ilmenite, and clinozoisite. The rock is inequigranular with grains from 0.1 mm to 6 mm in size. Though predominantly xenomorphic due to recrystallization, a hypidiomorphic fabric is present in some samples. Plagioclase is zoned, though not as distinctly as in the Faulkner Lake pluton or the Tumpline Lake tonalite. The cores are altered partly to a mixture of sericite, clay minerals, and locally clinozoisite. One sample (DRG-4) from the southern lobe displayed two grains in which two altered zones are separated by an unaltered zone. The composition of unaltered, irregular plagioclase rims ranges from An 9 to An 13. Myrmekite and patch antiperthite are present in trace amounts. Carlsbad, albite and pericline twinning are present.

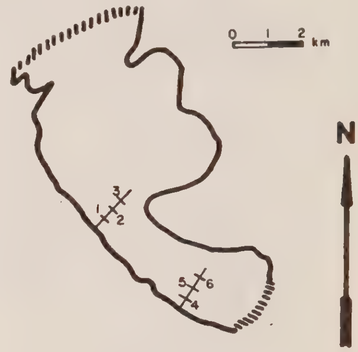
Cross-hatched microcline and string perthite is present in anhedral grains. Quartz has a mosaic texture and one sample (DGR-1) shows fine-grained quartz filling a fracture in another quartz grain. In northern lobe samples, biotite shows light to dark brown pleochroism and is mostly altered to penninite. In southern lobe samples, biotite exhibits less alteration and has a distinctive pale olive-to grayish-olive green pleochroism. Euhedral titanite, partly altered to leucoxene, is ubiquitous. Anhedral epidote present in most specimens is associated with biotite. An opaque, possibly ilmenite, is present in trace amounts. One large (1 mm) plate is surrounded by a rim of sericite (DGR-3).

Samples from this pluton show the distinctive fabric of other rocks of Unit 9, but the alteration is not as extensive and differs markedly in the two lobes. The northern lobe samples show more intensely altered plagioclase cores, higher percentage of microcline, appear to have lower concentrations of biotite, and more of the biotite is altered to chlorite than in the southern lobe samples. Compositionally the rocks of the northern lobe are granodiorites while those of the southern lobe are tonalites (trodhjemites).

EASTERN BIOTITE GRANITE

Henderson (1976) shows a major pluton, the Eastern Biotite Granite, on the eastern margin of the Hearne Lake Area. This body, designated Unit 10 - a massive medium-grained biotite adamellite with minor muscovite, was sampled just northeast of the contact of the granite with the metasedimentary rocks of the Burwash Formation (Fig. X1).

FIGURE XI-5: Eastern biotite granite pluton with sampling grid.



Hand specimens vary from medium-grained with grayish orange-pink to white feldspars to fine-grained with white feldspars. Clear anhedral quartz grains and black biotite plates are present. One specimen (EGR-1), contains 3-mm-long black tourmaline crystals in an albite-rich zone. Dark reddish-brown to red garnet crystals are visible in two samples (EGR-1, EGR-4).

The granite is xenomorphic and inequigranular except for fine-grained samples which are equigranular. Medium-grained samples have a 2 mm average grain size with a range of about 0.2 mm to 7.0 mm. As in the other rocks of the region, grain size distribution appears to be bimodal rather than normal.

The average composition, based on three samples, is 27% quartz, 34% microcline, 32% oligoclase (An 11), 6% biotite, and traces of muscovite, apatite, zircon, titanite, garnet, and oxides (ilmenite?). These specimens show little variation in composition.

Subhedral to anhedral plagioclase [(oligoclase (An 10-13)] shows minor zonation and alteration of the cores to sericite and clay minerals. Myrmekite is present between oligoclase and microcline grains. Oligoclase is twinned according to Carlsbad, albite, and pericline laws.

Anhedral microcline is common as string or patch perthite. In one sample (EGR-1), oligoclase is present as about 1-mm-long laths within a crystal of cross-hatched poikilitic microcline.

Anhedral quartz shows undulatory extinction, but does not have the distinctive sutured edges commonly seen in the other plutonics.

Shreddy light-to dark-brown pleochroic biotite is locally altered to a chlorite and a clay mineral. Minute zircons with pleochronic halos are common

inclusions and muscovite is in places intergrown with the biotite. One anhedral garnet was observed (EGR-5).

TUMPLINE LAKE BIOTITE LEUCOTONALITE (TRONDHJEMITE)

Tumpline Lake pluton, part of Henderson's (1976) Unit 9 biotite granodiorite, is northeast of Tumpline Lake and is partly surrounded by mafic and felsic volcanic rocks. The body is ellipsoidal in shape, 12.1 km long and 2.8 km wide (Fig. X1-6). A body of mixed granodiorite and supracrustal rocks (Unit 9a) is immediately adjacent to the northeast. Although shown as a single pluton, inliers of Burwash Formation metasedimentary rocks were noted near sample locality 8 and a mafic sill (dike?) at site 1 in the luecotonalite.

FIGURE XI-6: Tumpline Lake biotite leucononalite pluton with sampling grid.

The rock is massive, predominantly medium-grained, and contains moderate orange-pink to pale pink to white feldspar amongst clear quartz and black biotite plates (up to 5 mm across). Minute grains of greenish yellow epidote are visible adjacent to biotite plates. Grayish-yellow euhedral titanite crystals with leucoxene coating are commonly visible with a hand lens.

Under the microscope, the rock shows a xenomorphic to hypidiomorphic inequigranular texture. Some mortar texture is present as an interstitial fine-grained mixture of quartz and feldspar. The feldspar in this mixture appears to be primarily alkali feldspar (microcline and albite). Overall, the granitoid is estimated to be 28% quartz, 6% microcline, 58% oligoclase (An 14), 6% biotite, 2% epidote, with traces of apatite, zircon, titanite, amphibole, allanite (?), and oxides (illmenite?).

Plagioclase zoning is more highly developed than in any of the other plutons. The outermost rim of the subhedral plagioclase is oligoclase (An 13-An 16) and several additional zones are readily discerned. All but the latest rims are highly altered to sericite and to small amounts of clay minerals. Myrmekite is common within the interstitial material where oligoclase is adjacent to microcline. Patch antiperthite is a rare constituent. Carlsbad, albite, and pericline twinning is common.

Microcline is anhedral and is most common in the first two samples (TU-NE-1, TU-NE-3) and overall is present mainly in the fine-grained mortar. String perthite composes part of the microcline.

Microcline rarely displays sutured boundaries, but quartz commonly does. Undulatory extinction is diagnostic of the anhedral quartz. Most of the interstitial mortar is quartz.

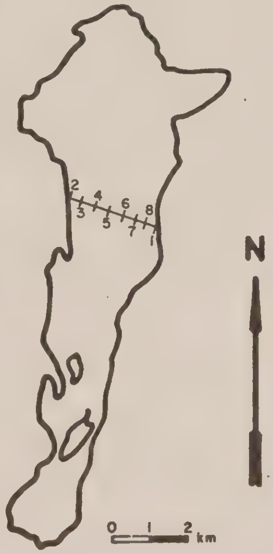
Biotite, the main auxiliary mineral, forms light to dark brown, shreddy, unoriented flakes, rarely large grains, and is largely confined to the mortar. It shows varying degrees of alteration to clay minerals and chlorite in all samples. Complete alteration to light to medium green pleochroic penninite was observed in one sample (TU-NE-5). A blue-green anhedral to subhedral amphibole (hornblende?) is present in trace amounts in two samples (TU-NE-4, TU-NE-8) and up to about 1% in one sample (TU-NE-10). Nearly all samples contain subhedral (rounded) apatite which is commonly associated with the mafic minerals. Euhedral titanite, partly altered to leucoxene, is present in all but two samples.

This pluton is readily distinguished by the ubiquitous, clear to light green, pleochroic, anhedral to euhedral epidote. Epidote, present in trace amounts to as much as 4% (TU-NE-8) is primarily associated with biotite. Twinned crystals of epidote are relatively common.

TUMPLINE LAKE BIOTITE-MUSCOVITE GRANITE

The eliptical- to triangular- shaped Tumpline Lake pluton, just west of Tumpline Lake, is representative of the massive, medium-grained biotite-muscovite adamellite of Unit 11 (Henderson, 1976). The body trends north-south, is 11.3 km long and is 4.3 km across at its widest point in the north and 1.4 km wide in the middle. Only part of the body was sampled. Inliers of flow felsites and metasedimentary rocks were observed in the middle of the outcrop. Apophyses of coarse-grained granites are present in the felsites (Fig. X1-7).

FIGURE XI-7: Tumpline Lake biotite-muscovite granite pluton with sampling grid.



Though finer grained, the Tumpline Lake granite appears similar to the Buckham Lake granite. The rock is fine to medium-grained and contains light orange-pink, grayish-pink, and white subhedral to euhedral feldspars, clear to slightly grayish anhedral quartz, dusky yellow to clear muscovite grains (up to 2 mm across), and black biotite (up to 3 mm) that is commonly intergrown with the muscovite. In one sample (TU-SW-2), irregular grains of light blue-green apatite are visible.

This xenomorphic, inequigranular rock exhibits a variation in grain size from about 0.1 mm up to 3 mm and is distinguished by its muscovite content. The

distribution of grain sizes is largely bimodal except in some fine-grained specimens which show a largely seriate distribution. A fine-grained mortar consisting of mainly sutured quartz and microcline plus biotite and muscovite surrounds the coarser grains. An average sample consists of 27% quartz, 28% microcline, 31% albite (An#9), 6% biotite, 8% muscovite, plus traces of apatite, zircon and, rarely, titanite. Tumpline Lake granite generally has a higher biotite content than does Buckham Lake granite.

Plagioclase is present as subhedral to euhedral albite (An 8-An10) exhibiting irregular rims and some zoning. Only rarely are the cores altered. Generally the entire albite crystal has large flakes of sericite developed within it. Myrmekite is present along microcline boundaries. Carlsbad and albite twinning is dominant, though pericline twinning is also present. Many crystals show bent twin lamellae. A weak foliation is evident in several samples (TU-SW-1, TU-SW-3, TU-SW-7).

Anhedral cross-hatched microcline is present in all sizes, and some crystals show Carlsbad twinning. String perthite is also present. The borders of the large microcline grains appear eroded and locally broken. Some grains are poikilitic. Muscovite is commonly concentrated around the rims of the microcline.

Quartz has sutured edges, distinctive undulatory extinction and is predominant in the fine-grained mortar.

Light to dark, sometimes reddish-brown, shreddy biotite is present in variable amounts and is variably altered to the penninite variety of clinochlore. Muscovite is intergrown with biotite, occurs as large plates, and defines a weak foliation in the mortar zones. Apatite is present in all samples as small, rounded, subhedral crystals.

CONCLUSIONS

Although no geochemical data is available and only part of the petrographic analysis is complete, certain conclusions and inferences are justifiable.

The broad categories used by Henderson (1976) to distinguish the plutonic bodies are substantiated. Rocks of Unit 9, biotite granodiorite, include the Faulkner Lake biotite leucotonalite, the Doubling Lake biotite leucogranodiorite, and the Tumpline Lake biotite leucotonalite. The sole representative of Unit 10, biotite adamellite, is the Eastern biotite granite. Rocks of Unit 11, biotite-muscovite adamellite, include the Buckham Lake biotite-muscovite leucogranite and the Tumpline Lake biotite-muscovite granite.

The three rock units do not appear to be related. Age differences (Green and Baadsgaard 1971), rare earth element date (Drury 1979) and the aforementioned petrographic data do not support any relationships between the tonalites and the biotite-muscovite granites. Based on petrography, the Eastern biotite granite does not appear to be related to the other granitoids, but the data is insufficient to prove this.

The rocks display the effects of at least three types of alteration: potassic metasomatism, albitization, and chloritization. The first two are probably autometasomatic, whereas the chloritization was probably later.

Within the broad categories, variations are evident which may, on continued study, further separate individual plutons. The low potassic feldspar content of the leucotonalites of Unit 9 distinguish them from the other rocks of the area. Green and Baadsgaard (1971) attribute these plutons to the initial plutonic event which caused the D_2 deformation as delineated by Ramsay and Kamineni (1977). Green and Baadsgaard (1971) considered these rocks to be products of mobilization of older sialic crust, but Drury (1979) has pointed out that the rare-earth element data do not bear out that conclusion and has suggested that the luecotonalites are similar to other synkinematic Archean tonalite and granodiorite plutons. The rocks, however, do show the effects of potassic metasomatism, especially the outermost two samples of the Tumpline Lake pluton and the northern lobe of the Doubling Lake pluton. The increase in microcline has caused a definite shift of the mode of these rocks into the granodiorite field. Distinctive zoning of the plagioclase in most cases suggests that these bodies equilibrated as tonalites or quartz diorites, and since have been metasomatized by potassium-rich fluids, especially along the margins of the bodies. Epidote is more common distant from the contacts and possibly resulted from deuteric alteration. The Faulkner Lake tonalite is anomalous in that, despite its narrowness, the body does not show the effect of potassium metasomatism to the same degree as the other bodies; furthermore it contains little epidote.

The Eastern biotite granite is not discussed extensively in the literature, having been included under the category of the older (low Potassium) granodiorites. The mode of the rock is significantly different from the other plutons, warranting the separate classification by Henderson (1976). The distinctive feature of the rock, as noted previously, is the poikilitic texture of the microcline, giving the appearance of extensive plagioclase replacement by potassic feldspar. Perhaps the intrusion of the eastern granite provided widespread potassium-rich fluids.

Rocks of Henderson's (1976) Unit 11 are exemplified by two bodies with similar characteristics. Of the two, Buckham Lake biotite-muscovite leucogranite is the most extensively altered. In both cases, microcline is partly replaced by albite with resultant formation of muscovite. The alteration of the Buckham Lake granite appears to be most extensive in the interior, where the lowest anorthite content, lowest biotite content, highest plagioclase to K-feldspar ratio, and highest muscovite content tend to be found. But one sample (BGR-1) collected from the south-east rim proved to be a muscovite microcline-albite. Geochemical data and further petrographic analysis of samples is needed to verify this interpretation. The Tumpline Lake biotite-muscovite granite is altered but not as extensively in the mid-portions of the body.

Henderson (1943) remarked that the granites (now composing Henderson's (1976) Unit 11) were younger than the granodiorites (Units 9 and 10). Green and Baadsgaard (1971) dated this Unit 11 at 2575 $\pm$ 25 m.y. based on an Rb-Sr mineral isochron from rocks of the Prosperous Lake granite, thus determining that this unit, along with the Redout Lake granite (Unit 12), are the youngest plutonic bodies in the area. The plutons were emplaced during the D_3 phase deformation of the area, the last major deformation event (Ramsay and Kamineni 1977). Based on rare-earth element data, O^{18} values, and the presence of almandine, Drury (1979) has

suggested a genesis for the granites involving melting of the local Archean sediments. Almandine has not been found in samples of the biotite-muscovite granite.

PEGMATITES

In the following descriptions of pegmatite series, swarms and bodies, emphasis is placed on features relevant to the petrological, geochemical and petrogenetic interpretation. Other aspects have been covered by Joliffe (1944), Rowe (1952), Mulligan (1968, 1975), Mosher (1969), Morrison (1975) and Lasmanis (1978).

Nomenclature of pegmatites used in this report is that condensed into brief letter symbols by Lasmanis 1978).

Terminology used in this report is briefly explained in Cerny et al (1981). The term pegmatite series is used loosely, serving as a descriptive term for closely associated pegmatite veins that may have a common source and that may have a different source than pegmatite bodies in another area. Pegmatite swarm is a descriptive term for small groups of pegmatites within a larger series. This terminology has no genetic implications; genetic relationships will be worked out, and the terminology adjusted, once the geochemical data becomes available.

Individual pegmatite series, swarms and bodies are shown in Figures 1 and 8 to 14. Mineral parageneses are summarized in Table 2. Semiquantitative estimates of mineral abundances, based on field observations, are aimed mainly at comparison of abundances of individual species in different pegmatites, rather than at abundances of different species within a single pegmatite body. To facilitate comparison with diversified pegmatite types from a thoroughly examined pegmatite field, and to facilitate recognition of geochemical-paragenetic mineral species absent from the pegmatites studied here, the form of paragenetic tabulation used is that applied to the Cat Lake-Winnipeg River pegmatite field in Manitoba (Cerny et al, 1981).

THE FAULKNER LAKE PEGMATITE SERIES

This pegmatite series consists of the BIG HILL, BET and MOOSE bodies and of the TAN swarm (Fig. 1). The series surrounds Faulkner Lake leucotonalite intrusion, but individual localities are between 0.5 and 4 km outside its contacts. The series is 15 to 20 km from its closest neighbors, the Buckham Lake East and the Doubling Lake series.

The BIG HILL pegmatite is approximately 160 m long and variable in thickness, reaching a maximum of 8 m in outcrop. It strikes, on the average, N26E, and dips subvertically. It is simple lenticular in shape, with gentle pinch-and-swell variations of thickness along its entire exposure.

Internal structure of the pegmatite is irregular, patchy to poorly zoned. In the best differentiated segments, the sequence is :

muscovitized nodular schist
qtz + plg + msc wall zone
K-fsp + plg + qtz + spod + msc intermediate zone
qtz + spod (± K-fsp, plg, msc) core.

However, most of the pegmatite is poorly differentiated and its mineral constituents are more or less evenly distributed over the whole width of the body. Spodumene laths vary in orientation from random to subparallel and lie at an oblique angle to the pegmatite contacts, which varies along the length of the body.

Metasomatic assemblages consist mainly of an irregular network of albite and secondary muscovite replacing mainly K-feldspar and spodumene. Metasomatic albite is mostly granular, rarely saccharoidal or platy cleavelandite. No Nb-Ta or Sn minerals were found.

The TAN swarm is located about 2 km east of the southeastern corner of Blatchford Lake. It consists of four separate pegmatite bodies roughly lenticular in shape (Fig. XI-8).

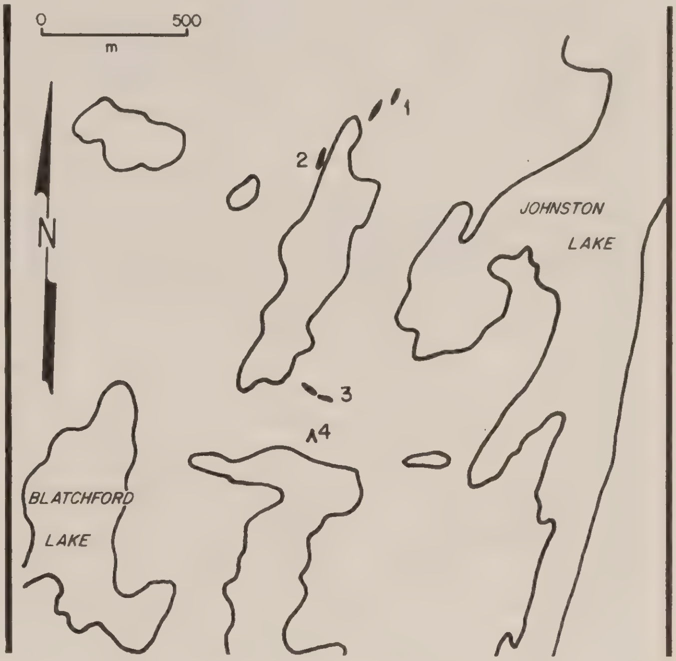


FIGURE XI-8: The TAN pegmatite swarm.

No. 1 pegmatite is 80 m long and, on average, 2.5 m wide. It strikes N20E and dips vertically cutting the foliation of the enclosing nodular metasediment at a shallow angle. The country rock shows local deformation and shearing along contacts. Zoning of the pegmatite which is regular along most of its length consists of:

muscovite nodular schist
qtz + plg + msc wall zone
qtz + cleavelandite + K-fsp intermediate zone
qtz + spod + K-fsp + msc + clevelandite core.

Alteration of spodumene to massive muscovite is locally extensive.

No. 2 pegmatite is 85 m long and has an average width of 3 m. It strikes N20E, dips steeply to the west and appears to be emplaced parallel to foliation. The pegmatite is zoned in a simple manner:

TABLE XI -2: MINERAL ABUNDANCES OF THE EXAMINED PEGMATITES

	FAULKNER LAKE				BUCKHAM LAKE						DOUBLING LAKE	
	BIG HILL 1	TAN 2	BET 3	MOOSE 4	LIT 5	HID 5	MAC 7	MUT 8	BIN 9	LENS 10	USK 11	WAS 12
Microcline	●	●	●	●	●	●	●	●	●	●	●	●
Oligoclase												
Albite	●	●	●	●	●	●	●	●	●	●	●	●
Quartz	●	●	●	●	●	●	●	●	●	●	●	●
Holmquistite												
Biotite												
Muscovite	X	O	O	O	O	O	O	X	O	O	O	O
Li-muscovite			·									
Lepidolite												
Spodumene	X	O	●	●	X	●	●	●	●	●	O	O
Petalite												
Eucryptite												
Pollucite												
Cordierite												
Garnet												
Schorl		·		·								
Elbaites												
Topaz												
Beryl		·	·	·	·		·					
Titanite												
Allanite												
Gadolinite												
Zircon												
Thorite												
Uraninite												
Magnetite												
Ilmenite												
Niobian rutile												
Gahnite												
Aeschynite												
Fersmite												
Euxenite												
Yttrotantalite												
Cassiterite		·		·								
Columbite-tantalite		·	·	·	·		·	·	·	·	·	
Pseudoixiolite												
Microlite												
Tapiolite												
Wodginite												
Simpsonite												
Stibiotantalite												
Apatite							·				·	
Monazite												
Xenotime												
Triphylite-lithiophilite		·			·		·		·		·	
Amblygonite-montebrasite		·	·	·	·		·	·				
Sulfides of Fe, Cu		·										
As												
Mo												
Zn, Cd												
Bi												
Sb												
Pb, Ag												

	THOR - ECHO															
	JO 13	PEA 14	PEB 15	ERD 16	MAN 17	SIDEHILL 18	CR 19	C1 20	C2 21	C3 22	CENTRAL 23	CR1 24	E#1 25	E#2 26	EASTERN 27	SE 28
Microcline	-- ●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Oligoclase																
Albite	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Quartz	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Holmquistite																
Biotite																
Muscovite	O	O	X	O	X	●	X	X	O	O	X	X	O	O	O	X
Li-muscovite																
Lepidolite																
Spodumene	X	O	●	●	X	X		·		·	●	·	X	X	O	
Petalite																
Eucryptite																
Pollucite																
Cordierite																
Garnet																
Schorl																
Elbaites																
Topaz																
Beryl	·		·	·	·	·					·				·	
Titanite																
Allanite																
Gadolinite																
Zircon																
Thorite																
Uraninite											?					
Magnetite																
Ilmenite																
Niobian rutile																
Gahnite																
Aeschynite																
Fersmite																
Euxenite																
Yttrotantalite																
Cassiterite																
Columbite-tantalite	·		·	·							·					
Pseudoixiolite																
Microlite																
Tapiolite																
Wodginite																
Simpsonite																
Stibiotantalite																
Apatite	·			·							·					
Monazite																
Xenotime																
Triphylite-lithiophilite	·		·	·		·					·					
Amblygonite-montebrasite	·															
Sulfides of Fe, Cu																
As																
Mo																
Zn, Cd				·												
Bi																
Sb																
Pb, Ag																

	THOR - ECHO									
	TANCO 29	WEST 30	SNAKE 31	PEEWEE 32	STRINGBEAN 33	ARA 34	ARB 35	ARD 36	ABE 37	ARF 38
Microcline	●	●	●	●	●	●	●	●	X	X
Oligoclase										
Albite	●	●	●	●	●	●	●	●	●	●
Quartz	●	●	●	●	●	●	●	●	●	●
Holmquistite										
Biotite										
Muscovite	O	X	O	O	O	X	X	X	X	X
Li-muscovite										
Lepidolite										
Spodumene	O	O	X	X		·	X	·		
Petalite										
Eucryptite										
Pollucite										
Cordierite										
Garnet										
Schorl										
Elbaites										
Topaz										
Beryl	·	·	·				?	·	·	
Titanite										
Allanite										
Gadolinite										
Zircon										
Thorite										
Uraninite										
Magnetite										
Ilmenite										
Niobian rutile										
Gahnite										
Aeschynite										
Fersmite										
Euxenite										
Yttrotantalite										
Cassiterite										
Columbite-tantalite	·	·	·	·				·	·	
Pseudoixiolite										
Microlite										
Tapiolite										
Wodginite										
Simpsonite										
Stibiotantalite										
Apatite		·	·	·						
Monazite										
Xenotime										
Triphylite-lithiophilite	·	·		·				·		
Amblygonite-montebrasite		·		·						
Sulfides of Fe, Cu										
As										
Mo										
Zn, Cd										
Bi										
Sb										
Pb, Ag										

● abundant O subordinate X low · rare

muscovitized nodular metasediment
qtz + plg + msc wall and intermediate zone
qtz + cleavelandite + K-fsp + spod + ambl core.

Metasomatic plagioclase and secondary muscovite are widespread. In many segments of the body, the blocky K-feldspar, amblygonite and spodumene are relict, corroded, embayed and veined by the late minerals.

Pegmatite No. 3 is poorly exposed, but it probably forms a discontinuous body over 100 m in length and averaging 3 m in width. It trends northwesterly and dips 75° to the northeast. Some of the discontinuities of the dike seems to be caused by bridges of the enclosing metasedimentary schists. The pegmatite appears to lack any distinct zoning, although coarse, blocky K-feldspar, amblygonite and spodumene tend to be concentrated in the central parts. The apparent lack of zoning probably results from extensive albitization which has erased most of the primary textural features. Different forms of albite (Coarse-grained, saccharoidal, cleavelandite) are closely associated with secondary muscovite.

Pegmatite No. 4 consists of isolated exposures trending N25E for 40 m, and an outcrop lying about 50 m to the northeast. The width varies between 3 and 6 m. It may be connected with the No. 3 pegmatite (Joliffe 1944). It is a sill rather than a dike, being emplaced parallel to foliation of the host metasedimentary schist, which dip approximately 60° to the west. Zoning of this pegmatite, somewhat better expressed than in the pegmatite No. 3 comprises:

muscovitized metasedimentary schist
qtz + plg + msc wall zone
qtz + plg + msc + K-fsp intermediate zone
qtz + plg + spod + msc core.

Albitization and secondary muscovite are widespread.

The BET pegmatite (Fig. XI-1) is approximately 100 m long and reaches 8 m in width. It strikes slightly east of north, dips steeply to the west and is roughly concordant with foliation of the enclosing biotite schist. A serrated edge of schist marks the hanging-wall contact, suggesting a shearing movement along the pegmatite-hosting fracture before dilation and injection. The pegmatite is well zoned, with spodumene crystals and amblygonite blocks reaching 2 and 1 m in size respectively in the central parts. Zoning comprises:

muscovitized biotite schist
fine-grained qtz + msc border zone
qtz + plg + msc wall zone
K-fsp + qtz + spod + msc intermediate zone
qtz + msc ± K-fsp core.

Most of the plg + msc assemblage is metasomatic, with cleavelandite being the predominant albite habit. Greenish lithian muscovite was reported by Mosher (1969), in addition to the widespread yellow-green secondary muscovite. As in other pegmatites of the series, beryl and columbite-tantalite are closely associated with the metasomatic albitization.

The MOOSE pegmatites 1 and 2 lie close to the shore of Hearne Channel (Fig. XI-1). Dike No. 2 extends about 420 m along a northerly strike, and reaches maximum width of 60 m. Its overall dip seems to be steeply to the west. It is exposed in three sections, at least one of these is offset by a fault. The smaller No. 1 dike is just under 300 m long, attains a maximum thickness of 10 m and also strikes north and dips steeply. Both dikes seem to be emplaced into parts of the same fracture system, despite their 1,600 m separation. Their internal zoning and mineralization are analogous, and described jointly below.

Zoning is well developed, varying with zone width and mineral assemblage along strike and comprises:

muscovitized nodular metasediment
qtz + msc border zone
K-fsp + qtz + msc + cleavelandite wall zone
qtz ± spod ± ambl core.

The quartz core is particularly well developed in the Moon No. 2 dike, reaching a width of about 4 m. In terms of maximum crystal sizes of K-feldspar, spodumene and amblygonite, the Moon pegmatites are analogous to the BET ocurrence. Patches and stringers of metasomatic albite + secondary muscovite are scattered across the whole width of the dikes, penetrating all zones.

BUCKHAM LAKE WEST SERIES

This loosely-defined pegmatite series is scattered west of the northern part of Buckham Lake, 4 to 13 km from the margins of the Buckham Lake biotite-muscovite leucogranite (Fig. 1). The series consists of the LIT, HID and MAC pegmatites.

The LIT locality is exposed along the north-northwest shore of the northern part of Buckham Lake (Fig. XI-9). A series of outcrops, possibly belonging to a single pegmatite, is strung out nearly parallel to the N45E-striking foliation of the nodular metasedimentary country rock. The pegmatite(s) dip 70 to 85° to the northwest, are poorly zoned, with log-shaped spodumene crystals scattered from country rock contacts to the cores. Albitization is, however, extensive, and may have obliterated structural features of primary crystallization. Mineral assemblage, Table 2, is as diversified as in the better-zoned pegmatites of the Faulkner Lake series. Beryl and

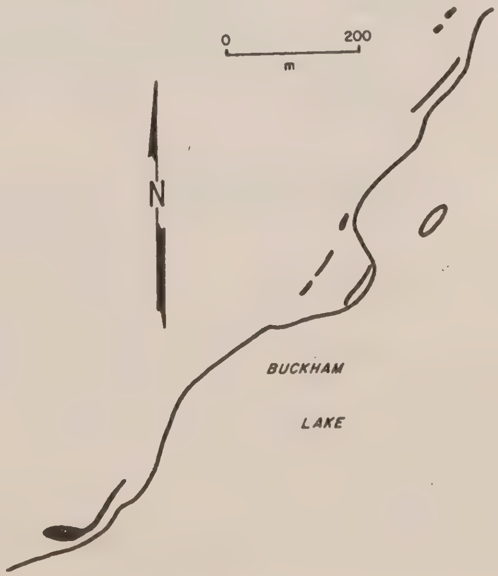


FIGURE XI-9: The LIT pegmatite.

columbite-tantalite are associated with metasomatic albite and secondary muscovite.

The HID pegmatite is approximately 200 m long and reaches about 6 m in maximum width (Fig. X1-10). It strikes N70E and, on average, dips steeply to the north, crosscutting foliation of the enclosing biotite-rich metasedimentary schist at a slight angle. The dike is possibly discontinuous, poorly zoned, spodumene-rich, and locally strongly albitized in an irregular patchy manner. Surprisingly, no accessory minerals of Be, Nb-Ta or Sn were found, although the pegmatite does not seem to differ from others in the area that carry both beryl and columbite-tantalite.

FIGURE XI-10: The HID and MAC pegmatites.

The MAC pegmatite (Fig. X1-10) is hosted by a nodular quartz-mica schist, with which it appears to be conformable. It strikes N80W, and has an average dip of about 60° to the south. The outcrop is about 120 m long and averages approximately 10 m in width. Zoning, well developed over the length of the outcrop and most conspicuously in the central parts of the pegmatite comprises:

<u>muscovitized metasedimentary schist</u>
qtz + msc + plg border zone
qtz + plg + msc wall zone
qtz + plg + spod + msc outer intermediate zone
K-fsp + qtz + spod + ambl + msc inner intermediate zone
qtz + msc core.

Intermediate zones predominate in volume in this pegmatite. The quartz core is discontinuous, consisting of a series of separate quartz lenses. Albitization plus secondary muscovite are widespread mainly in the central parts of the pegmatite where the most conspicuous accumulations of beryl and columbite-tantalite are found. Muscovite-rich units are asymmetric, with that in the hanging-wall segment of the pegmatite much thicker (approximately 2.5 m) than its footwall counterpart (up to 1 m).

BUCKHAM LAKE EAST SERIES

This series consists of the MUT, BIN and LENS pegmatites that lie east of the southwestern arm of Buckham Lake (Figs. X1-1, -11 and -12). All members of this series penetrate nodular metasedimentary quartz-biotite schist.

The MUT pegmatite (Fig. X1-11) is about 80 m long and averages 5 m in thickness. It strikes N45E, dips vertically and is poorly zoned. Most of the pegmatite appears homogeneous, and has a high content of rather uniformly distributed spodumene. Quartz pods locally near the center of the pegmatite represent a segmented quartz core. Patchy alteration by sodic metasomatism (albite + secondary muscovite) is widespread; however, no Be or Nb-Ta, or Sn bearing minerals have been found.

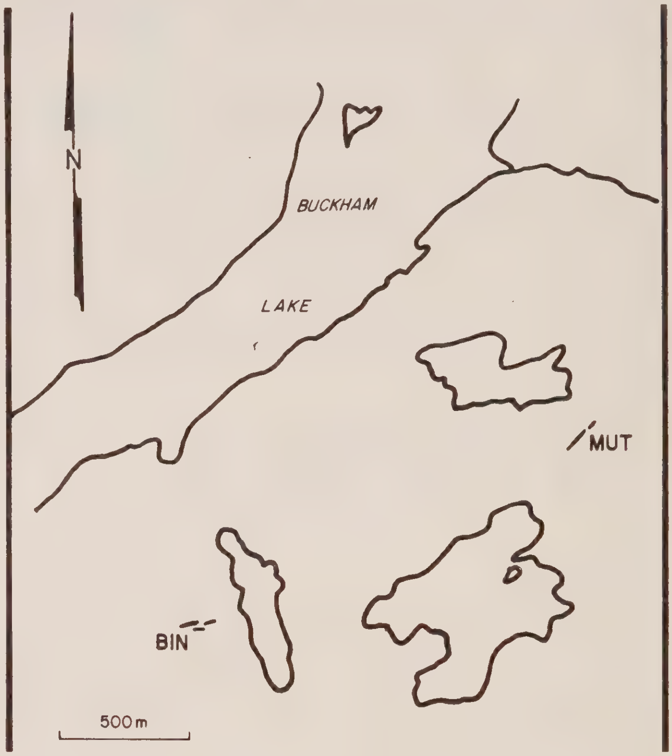


FIGURE XI-11: The MUT and BIN pegmatites.

The BIN pegmatites (Fig. X1-11) appear to be separate pegmatites with similar internal structure and mineralogy. Both strike between N56E and N75E. Their dip could not be clearly established, but it is undoubtedly steep. These pegmatites appear to be even more homogeneous in their internal structure than the MUT. Spodumene is abundant, but considerably replaced by massive mica. Albitization is associated with secondary muscovite, accessory beryl and columbite-tantalite.

The LENS pegmatite (Fig. X1-12) is lenticular, outcrops over approximately 80 m, and reaches a maximum thickness of about 18 m in its central parts. It strikes N10W, and dips vertically, parallel to foliation of the enclosing nodular metasedimentary schist. It appears to be the most spodumene-enriched pegmatite of this series, with spodumene uniformly distributed throughout. Locally the spodumene displays uniform subparallel orientation of its bladed crystals,

but this preferred orientation varies from one part of the pegmatite to another. Secondary alteration is widespread; metasomatic albite and secondary muscovite locally contain columbite- tantalite and beryl.

THOR-ECHO SERIES

The Thor-Echo pegmatite series is the most diversified and contains the most individual pegmatites of any of the series in the Yellowknife pegmatite field. It consists of several individual pegmatite dikes and swarms. Summary descriptions which follow stress characteristic differences and similarities among the swarm members.

FIGURE XI-12: The LENS pegmatite.

The WEST pegmatite, a lenticular dike approximately 45 m long and as much as 5 m thick, trends N45W conformably with bedding in the enclosing nodular metasedimentary schist. It splits into subparallel stringers near its terminations and is conspicuously zoned as follows:

<u>muscovitized nodular schist</u>
plg + msc + qtz wall zone
plg + K-fsp + msc + qtz $\pm$ spod intermediate zone
qtz + spod $\pm$ K-fsp core.

As in other pegmatites of the area, the primary composition and structure of the outer zones were extensively altered by sodium metasomatism and muscovitization. Nevertheless, a random orientation of blocky K-feldspar crystals, and log-shaped spodumene crystals subnormal to the trend of the dike indicates primary crystallization in a static environment. Beryl, columbite-tantalite, apatite and altered triphylite lithophilite are associated with albitization.

The TANCO pegmatite lies on strike to the southeast of the WEST body (Fig. X1-13). It consists of two segments which could have been separated by a fault, but the relationship is not clear from surface exposure. The pegmatite is about 180 m long and attains its maximum width of approximately 8 m at the northwestern termination. It trends N40W, and has a subvertical dip. The pegmatite is largely homogeneous, consisting predominantly of quartz, albite and subordinate muscovite. Blocky K-feldspar, spodumene and amblygonite dispersed in the predominant assemblage are somewhat more abundant in the central parts of the body. Late post-crystallization extension roughly parallel to the strike of the pegmatite dike produced slightly dilated fractures that are healed by quartz. Beryl and columbite-tantalite occur in the 'matrix' assemblage close to local concentrations of blocky K-feldspar and spodumene.

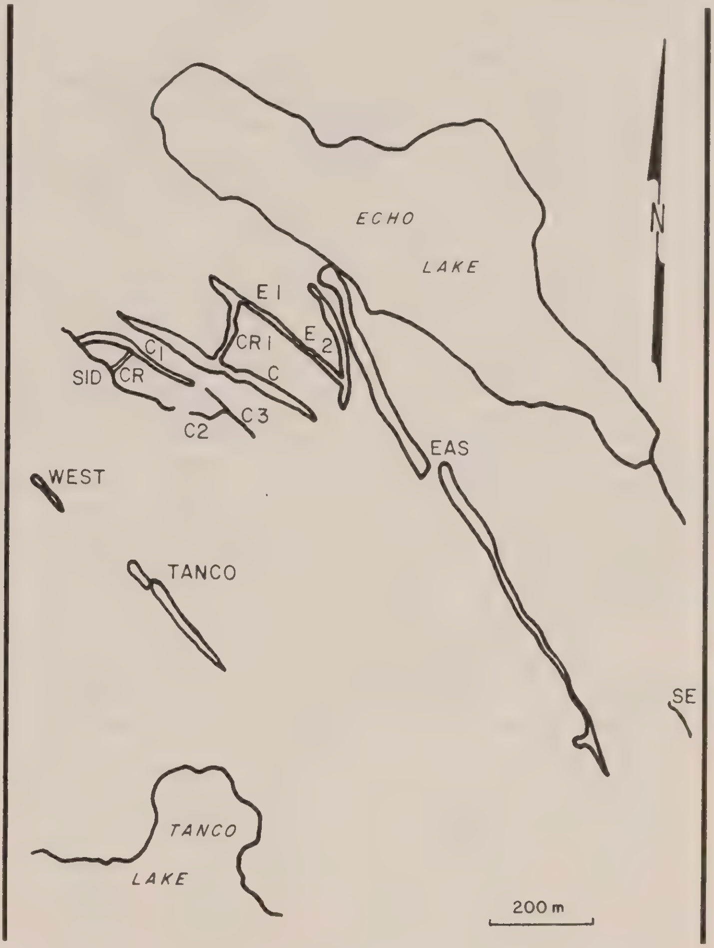


FIGURE XI-13: The WEST and TANCO pegmatites, the CENTRAL swarm and the EASTERN pegmatites.

The CENTRAL SWARM of pegmatite dikes shown in Figure X1-13 consists, essentially, of two sets of pegmatites: one trending subparallel to the TANCO and WEST bodies, slightly west of NW, the other oriented sub-normal to the first. The first set dips steeply to NE, the second appears to be subvertical. The two sets of pegmatites differ considerably in their internal structure, and partly also in their mineralogy.

The NW-trending set comprises mostly homogeneous or poorly- zoned dikes that display the effects of tectonism that took place before, during, and after crystallization. Deformation of

metasedimentary schist wallrock, to the point of shearing and brecciation is common. A ladder-type structure with elongate K-feldspar and lath-shaped spodumene in uniform subparallel orientation across the dike is typical of most of the Central pegmatite, and local segments of this structure are also found in other pegmatites of the NW-trending set. Finally, shearing and muscovitization along slicken-sided fractures is common, although on a penetrative scale rather than along conspicuous large-scale structural breaks. The extent of albitization and associated non-tectonic muscovitization is difficult to establish beyond recognizing its general presence. The Be, Nb-Ta bearing mineralization and associated altered phosphates are, however, rare.

The NE-trending set displays, in contrast, random orientation of blocky K-feldspar and spodumene in its roughly-zoned bodies which bridge, and interconnect with, the NW-trending dikes. Post crystallization tectonic disturbance is minimal, as is albitization, and primary structures indicate solidification in a static regime. Rare-element mineralization is virtually absent.

The EASTERN dikes are oriented parallel to the NW-trending set of the CENTRAL swarm: strike N40W and dip 60-70 to the NE (Fig. X1-13). However, internal structure varies along the strike of the major member of this swarm, showing complete gradation from brecciated, sheared and virtually homogeneous segments to zoned, undisturbed portions. Nevertheless, the few ENE-trending offshoots near its northern termination show the best-developed blocky cores, a lack of substantial metasomatism, and a low degree of Nb-Ta and Be mineralization, which is analogous to the CENTRAL NE-trending set. Spodumene is abundant in the EAST pegmatite but was not observed in the exposed tail-end of the SE dike which obviously extends beneath swamp cover to the southeast.

The ARACHIDE* swarm extends south-southwest from the island in the southeastern area of Tanco Lake (Fig. X1-14). On the island the MANOKO and ERDNUSS pegmatites may possibly be interconnected under the heavy vegetation cover of the central parts of the island. Both exposures are rich in beryl; however, the Manoko outcrop largely lacks internal differentiation whereas the subhorizontally oriented, gently NW dipping ERDNUSS body is well zoned: its conspicuous quartz core, with log-shaped spodumene is rimmed by blocky K-feldspar, altered triphylite-lithiophilite and spodumene, and this intermediate zone is in turn enveloped by muscovite + albite-rich wall and border zones. Beryl and columbite-tantalite are relatively abundant.

The ARACHIDE bodies proper, PEA and PEG (Fig. 14), are poorly zoned, with log-shaped spodumene and blocky feldspar occupying most of the space between small central blebs of quartz and thin, medium-grained, muscovite-rich wall zones. Columbite-tantalite and beryl are concentrated, with albite, close to the quartz core.

The ARACHIDE pegmatites penetrated a complicated set of fractures. Most of these bodies are thin, and mutually interconnected. They differ from practically all other pegmatites investigated in the region by being almost completely albitized: K-feldspar is preserved only in a few wide segments of the dikes, and even muscovite appears to be subordinate. It is, however, abundant in the exomorphic alteration of metasedimentary wallrock. Beryl and spotty

FIGURE XI-14: The THOR-ECHO series, except the JO swarm.

accumulations of columbite-tantalite are found locally; spodumene is subordinate, and locally completely replaced by radial aggregates of fibrous albite + muscovite.

The SPS swarm extends to the northwest from the TANCO and WEST pegmatites (Fig. X1-14). The SNAKE and PEEWEE outcrops are probably interconnected by narrow (<30 cm), completely twisting stringers; and an array of similar thin stringers suggests a connection between the PEEWEE body and the western extremity of the CENTRAL swarm. The PEEWEE pegmatite is the only zoned body in this swarm. It has a distinct core and blocky intermediate zones and displays the most diversified mineral assemblage. In contrast, the STRINGBEAN pegmatite, separated from the others by a swamp-covered area, is homogeneous and simple in composition, lacking even spodumene. (Table X1-2,32- 33)

The JO swarm (Fig. X1-2) resembles closely the ARACHIDE pegmatites in its array of interconnected dikes that fill a complex system of fractures. Also, most of its members are thin (<1 m), the only exception being the main body on which a pit has been blasted. The main body is zoned, with abundant blocky K-feldspar

and columnar spodumene, with albite + muscovite of the replacement complex concentrated along the contacts with the metasedimentary country rock. The thin veins surrounding the main body are composed predominantly of albite, quartz and muscovite, with local relict K-feldspar and beryl crystals. Platy columbite-tantalite and white beryl are conspicuously concentrated along margins of quartz in the main pegmatite body, (Table X1-2,13)

DOUBLING LAKE SERIES

This series consists of two pegmatites less than 1 km from the margins of the Doubling Lake biotite leucogranodiorite (Fig.X1-1).

The USK pegmatite is exposed in three outcrops over a total length of 50 m, and reachs 12 m in width. It trends easterly, but the dip could not be accurately established; it appears to be moderate to the south. No explicit zoning is evident at the erosion surface; irregular variations in grain size, blocky K-feldspar and columnar spodumene are conspicuous. All the accessory minerals present in the other pegmatites except for the beryl, have been found, (Table X1-2,11)

The WAS pegmatite extends for 400 m and reaches a width of 10 m. It is extremely homogeneous and relatively fine-grained, and does not seem to contain any rare-element minerals besides spodumene. However, because of its small grain size and homogeneous internal structure, more extensive examination is required to verify this conclusion.

GENERAL CHARACTERISTICS

Uniformity of main and accessory mineral content is one of the most conspicuous characteristics of the pegmatites in the segment of the Yellowknife pegmatite field examined in 1980 (Tables X1-2).

The main variables of the pegmatites are their shape, dimensions, and internal structure, which are dictated by the tectonic regime during and after their emplacement: the pegmatites vary from well-zoned bodies with random orientation of major mineral components (crystallization in open static fractures) to ladder-type veins with cross-angling preffered orientation of K-feldspar and spodumene (solidification in fractures dilating during crystallization), and from bodies with minimal indication of post-crystallizational disturbances to those that display one or more of; shearing along country-rock contacts, brecciation of internal zones, and dilation with cross-fractures filled by late quartz. The tectonic factors influencing internal structure vary on a local scale and randomly.

The structural diversity seems to be unrelated to any paragenetic-geochemical features of the pegmatites; the only exception is the apparent difference between NW- and NE- trending pegmatites in the Central Swarm of the Thor-Echo series. In general, the unzoned pegmatites have a uniform distribution of main and accessory minerals throughout their whole thickness. The zoned pegmatites show an increase in grain size, quartz, and spodumene towards the core, with K-feldspar accumulated either in the core of in the intermediate zone adjacent to it.

Metasomatic processes are represented mainly by albitization accompanied by development of secondary muscovite. The extent of albitization is highly variable but it has most commonly affected the wall and intermediate zones, replacing initially the K-fe dspar and progressively also quartz and spodumene. Albitization of K-feldspar, or its hydrolysis yielding muscovite, release potassium which is evidently responsible for micaceous breakdown of spodumene and for the ubiquitous muscovite in pegmatite exocontacts.

Spodumene and amblygonite are the only ore minerals which belong to the primary assemblage of the pegmatites. Spodumene is uniformly dispersed throughout the width of homogeneous pegmatites, but it is concentrated in central parts of zoned bodies. Amblygonite seems to be restricted to pegmatite cores. The other components of economic interest - Be, Nb-Ta and Sn bearing minerals - are associated with albite and secondary muscovite of the sodium metasomatism stage, except for a few giant beryls along the intermediate zone-core boundary. Published data and our own observations suggest a direct correlation between the intensity of albitic metasomatism and the Nb, Ta, Sn mineralization, if the pegmatites are prorated on an equal-volume basis. Platy columbite-tantalite associated with medium-grained albite or cleavelandite is the predominant type of this mineral. Saccharoidal albitization is very restricted relative to other textural types, and is not developed at all in many pegmatites.

TENTATIVE GENETIC INTERPRETATIONS

On the basis of modes and textural characterists, none of the granitoid plutons seems to have the attributes of a pegmatite-generating intrusion. All granitoid plutons are extremely uniform in grain size and lack internal pegmatitic facies or veins. The only intrusion which may be at least related to pegmatite-generating magmas is the Buckham Lake two-mica leucogranite, which appears to be poor in Ca and extensively albitized. The compositional diversity of granitoid intrusions in the area is in sharp contrast to the relative uniformity of the pegmatites, and this supports the conclusion that only a few, if any, of the exposed granitoids can be genetically related to the pegmatites. Another fact which supports this conclusion is the pegmatitic character of leucogranites in the northwestern part of the pegmatite field. These are generally accepted as intrusions parental to their pegmatite-generating granitoids within a pegmatite field of about 13,000 square km; the granitoid- and pegmatite-generating process may take somewhat different paths in two widely separated segments of the Yellowknife Basin. Such a diversity has been documented by Cerny et al. (1981). Nevertheless, the difference between the granitoids of the examined area and of the Prosperous Lake-Prelude Lake-Sparrow Lake area is so conspicuous, and the diversity among the granitoids of the examined area is so great, that most of the exposed granitoids cannot be considered parental to mineralized pegmatites. More definite conclusions in this respect can be reached only when geochemical data for both granitoids and pegmatites become available, and particularly when the data are collected on the granitoids and pegmatites of the whole pegmatite field, and mutual comparison of all granitoid- pegmatite associations becomes feasible. At present, the modal, structural and paragenetic data suggest that most, and probably all, of the granitoids parental to the mineralized pegmatites of the southeastern section of the Yellowknife pegmatite field are hidden below the present erosion level.

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CHAPTER XII

PROGRESS REPORT ON GEOLOGICAL STUDIES IN THE GREAT BEAR LAKE AREA, NORTHWEST TERRITORIES

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This report records the progress on the project entitled: Geological studies in the Great Bear Lake area; a study partly funded by D.I.A.N.D. during the 1980-1981 fiscal year. This study has two major objectives: 1) to establish a geochronologic framework for Wopmay Orogen and 2) to conduct detailed field and geochemical studies within the Great Bear Volcano-Plutonic Belt (Sloan and Dumas Groups, see Fig. XII-1).

The preliminary geochronologic framework of the orogen was presented in Atlanta at the Geological Society of America annual meeting (Van Schums and Bowring, 1980). The most striking results of the geochronologic work is that we were able to resolve small (5-15 m.y.) age differences in the rocks and that the ages are consistent with the two-collision model proposed by Hoffman (1980). The mean age of the Hepburn Batholith is 1890 ± 15 and that of the Great Bear Belt is 1870 ± 10. A foliated granodiorite from the older terrane at Hottah Lake yields an age of 1920 ± 10. Currently we are attempting to further resolve the ages of individual units within the Great Bear and Hepburn Batholiths.

Because of the relatively short time interval found between the various events we concentrated on U-Pb analysis of zircons during the first year of work. We still have further zircon analyses to do in order to try to resolve events more precisely, and we plan to follow this up with Rb-Sr and Sm-Nd analyses as necessary to further evaluate the absolute ages of some units as well as to examine their isotopic signatures.

Regional mapping (Hoffman and McGlynn, 1977; Hoffman, 1978) showed that the Sloan and Dumas Groups consisted of broadly folded, enormously thick sequences of unmetamorphosed volcanic and sedimentary rocks intruded by granitic plutons. McGlynn (1977) and Hoffman (1978) showed that the entire Great Bear Volcano-Plutonic Belt is cut by numerous, nearly vertical, northeast-trending strike-slip faults that post-date magmatism in the belt and that bend, splay, and die out towards the eastern margin of the belt, the Wopmay Fault. Prior to this study, detailed stratigraphic and structural relations within the Sloan and Dumas Groups were not well understood. During the summer of 1980 Bowring spent approximately 12 weeks mapping a portion of the Sloan and Dumas Groups. The mapping has resulted in several important discoveries which will lead to refinements of petrogenetic and tectonic models proposed for the orogen (Hoffman, 1980).

Detailed structural and stratigraphic study has shown that the thickness of the supracrustals in the Dumas Group is about one half as much as suggested by Hoffman and McGlynn (1977) and that folding and faulting dramatically increase towards the Wopmay Fault. In addition, Hoffman's (1978) division between the Sloan and Dumas Groups has been modified. One of the major discoveries of the 1980 work was a well-developed unconformity on top of the golf-ball porphyry. The unconformity is marked by up to several hundred meters of conglomerates and sandstones deposited on the unroofed porphyry. This unconformity is now used to separate the Dumas and Sloan Group rocks as can be seen in Figures XII-2 and XII-3.

Much of the 1980 mapping was concentrated near the Wopmay Fault where northeast trending folds are dismembered into many fault blocks that have been rotated independently of one another. Additional mapping may allow separation of faulting contemporaneous with deposition of the Dumas and Sloan Group rocks from the later episode of transcurrent faulting and allow speculation about the tectonic regime during accumulation of the Sloan and Dumas Groups. This will have important implications for much of the Great Bear Belt where a well defined stratigraphy has not been determined.

Mapping during the 1980 field season delineated at least one large ash-flow-tuff cauldron which is now exposed in cross section. This permits a rare opportunity to study the complete 3 dimensional structure of a cauldron and the relationships between cauldrons, subcauldron plutons, and their associated hydrothermal systems. Associated with the southern ring fault is a zone of intense propylitic alteration with abundant hematite mineralization and some sulfides. Additional work during the 1981 field season will allow examination of the northern boundary and evaluation of any significant mineralization. A chaotic zone of gneissic basement rock in the floor of the cauldron was discovered in 1980 and was sampled for a zircon age determination. The age and nature of this apparent 'basement' will be extremely important in understanding the internal structure of the volcano-plutonic belt as well as providing important thickness constraints on the supracrustal sequence.

The Wopmay Fault is a prominent feature that extends the entire exposed length of the orogen and has been interpreted as a longitudinal transcurrent fault (Hoffman, 1980). The upper part of the Dumas Group oversteps the fault and unconformably overlies high-grade metamorphic and batholithic rocks to the east. Mapping along the Wopmay Fault zone during last summer has revealed unexpected complexities which are not well understood at this time. In places the fault zone appears to have two or more parallel branches and along the fault the Dumas Group rocks strike parallel to the fault and may not be folded. Hoffman and St.Onge (1981) have suggested that part of the Wopmay Fault is a thrust boundary. Continued mapping of the fault zone will help in the understanding of this fundamental though enigmatic feature of the Wopmay Orogen.

Petrographic and geochemical studies of the plutonic and volcanic rocks have been initiated. The rocks have been moderately to highly altered by hydrothermal process and will be analysed for a suite of 'immobile' elements in order to determine the broad chemical affinities of the rocks.

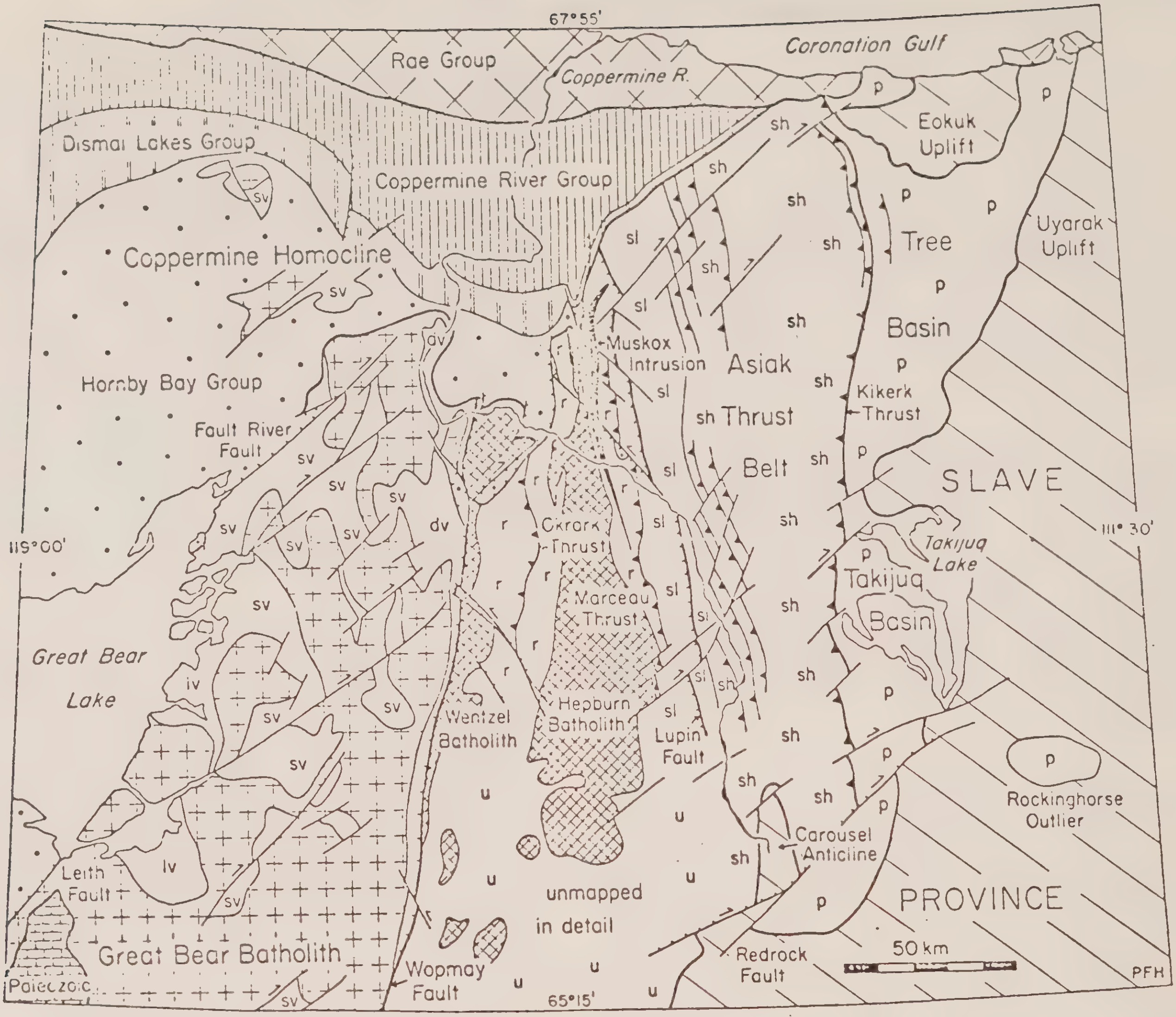

Figure XII-1: Geology of the north end of the Wopmay Orogen. Lithotectonic units: lv - LaBine Group, sv - Sloan Group, dv - Dumas Subgroup, r - rift and continental rise facies plus orogenic deposits, sl - continental slope facies plus orogenic deposits, p - platform facies plus orogenic deposits, u - undivided rift, rise, and slope facies (after Hoffman, 1980).

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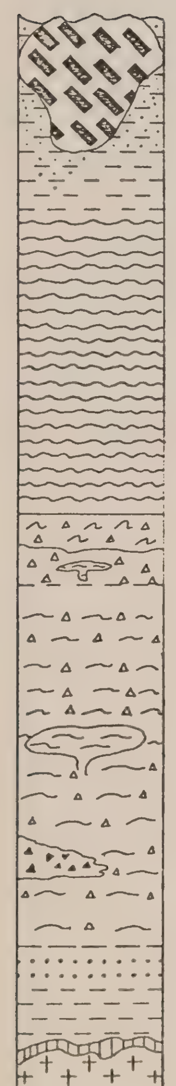

Figure XII-2: Stratigraphic column of Sloan Group rocks southwestern corner, Kamut Lake sheet (86K/9)

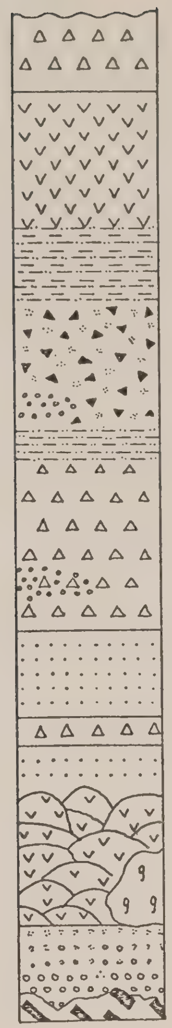

Figure XII-3: Stratigraphic column of Dumas Group rocks, Dumas Lake area (86K/9-86K/8)

CHAPTER XIII MAGNETITE-ASSOCIATED URANIUM DEPOSITS OF THE WOPMAY FAULT

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INTRODUCTION

West of the Wopmay Fault, a narrow belt of metasedimentary rock extends from about 66°30'N to 64°30'N, with a few scattered remnants further south. These paragneisses and biotite schists were originally correlated with the Snare group, and although their stratigraphic position is now in question, they will still be referred to as late Aphebian, the Snare group, in this paper.

These rocks are characterized by uranium deposits associated with magnetite. From north to south, these deposits are:

Jackpot claims: 116°30'W 65°42'N
Hailstone Lake: 116°50'W 64°47'N
(Ham and Jones claims)
JLD claims : 116°50'W 64°37'N
De Vries Lake : 116°50'W 64°21'N
(NORI/RA claims)

In addition, two other deposits show affinities with the group:

CAM showing :116°05'W 66°47'N
(and the nearby FC showing)
Mazenod Lake :116°55'W 63°45'N
(Sue and Dianne claims)

The principle 'magnetic belt' is 150 km long, from Jackpot to De Vries Lake. If all the properties are considered, the magnetic belt extends the full length of the Wopmay Fault, 350 km. The zone of magnetite lenses seems to be well under a hundred metres wide, although there can be multiple zones (e.g. Hailstone Lake, De Vries Lake), and continuity has not been proven on any scale beyond a few hundred metres.

GENERAL GEOLOGY

This study focused on the Jackpot group, but data from all the deposits are utilized. In each case, the deposits are 5 to 15 km west of the Wopmay Fault, in the Great Bear batholith. At Mazenod Lake, a copper-uranium deposit is hosted by acidic ignimbrites with associated fine-grained sandstones. The CAM and FC showings are at the unconformity with the overlying Hornby Bay (Helikian) sandstones. At the other deposits, the host rocks are Snare group paragneisses and biotite schists, which contain lenses and veins of magnetite of two or three generations. These metasedimentary rocks were intruded by granitic plutons of the Great Bear batholith.

MAGNETITE

All generations of magnetite are superficially similar, being equigranular, subhedral or anhedral, and generally less than 1/2 mm in diameter. Attempts were made to define groups by their Ti content and trace amounts of Mg and Al, but although there may be two groups, they could not be associated with any visible characteristics or any particular age or type. Magnetite rock usually contains up to 10% silicate minerals, particularly early muscovite and a later, secondary biotite.

The earliest type of magnetite is conformable, and has undergone boudinage and brittle deformation if more than a few centimeters thick, or ptygmatic folding in places if thinner. Study of the De Vries Lake strata suggests a sedimentary origin. Here, magnetite first occurs as flecks and tiny augen in leucocratic paragneiss. More iron-rich horizons are finely laminated and folded. As these layers contain progressively more magnetite, they lose their plasticity and start to undergo brittle deformation. The largest pods observed, those at Hailstone Lake, are as much as several meters long and a few meters wide.

The second generation of magnetite comprises veins up to 10 cm thick, which are clearly discordant and contain breccia of altered country schist. They are not usually folded, but slightly sheared and fractured, with remobilised biotite filling the cracks.

A third generation is occasionally found in pegmatite veinlets as at Jackpot, where they are a few centimeters thick. These are quartz-biotite-muscovite-plagioclase-tourmaline rocks. At De Vries Lake, they may be several meters thick, and show a trend with time from predominant biotite, to predominant tourmaline, to quartz-pyrite veins and finally to pure pyrite members.

The second generation of magnetite is regarded as a remobilization of the first. The first generation, syngenetic magnetite, may originally have been haematite or ankerite, reduced during metamorphism, but was more likely a geothitic material. This has the ability to absorb 300 ppm boron from marine environments (Wedepohl et al., 1974), and also absorb uranium, properties which will be shown to be necessary in the proposed model.

Magnetite is not common at Mazenod Lake, although small amounts of euhedral magnetite were found in the acidic lavas. There is, however, a very large magnetic anomaly beneath the area, and it is impregnated with massive haematite. Although some of this is primary, as shown by its platy crystal form, much of it is oxidised magnetite; this forms granular pseudomorphs which often have relect magnetite cores. Similarily, at CAM there is a unit of massive haematite (95% haematite) which was entirely derived by the oxidation oof magnetite. The emplacement of the original magnetite may correlate with the second generation magnetite at Jackpot, and suggests a widespread "magnetic event" along the Wopmay Fault.

In summary, all magnetite was present before the cessation of tectonism, about 1700 Ma ago.

BORON METASOMATISM

At Jackpot and De Vries Lake, intense boron metasomatism has accompanied the remobilization of magnetite. It is not yet known if this also occurred at the Hailstone Lake and JLD occurrences; it is not always obvious in the field, and has not been recorded previously.

The boron metasomatism has converted biotite schist into unfoliated tourmaline or tourmaline-quartz-biotite rock, with accessory dumortierite, cordierite, xenotime, manganiferous almadine garnet, ilmenite, pseudobrookite, rutile, chlorite and pitchblende. Uranium and rare earth elements were

introduced at the same time as the boron. Tourmaline fringes may surround any of the pegmatite or magnetite bodies, and are thickest at De Vries Lake (up to 50 cm). At first sight they resemble fine-grained biotite rock or even magnetite, which may also be present. Tourmaline also occurs at Mazenod Lake, as fine veinlets which dissect the country rock into pipe-shaped breccia bodies. It has also been found in high-grade, so-called Akaitcho group metasedimentary rocks at the FC uranium showing, near CAM, but only in trace amounts.

Tourmalinization cannot be a result of pegmatite intrusion because at Jackpot there are no pegmatites at all in some heavily tourmalized areas, notably at an abandoned adit. Similarily, no pegmatites were observed at Mazenod Lake or at FC. The local granites do not appear to be boron rich at Jackpot, although the pegmatites at De Vries Lake are tourmaline-bearing adjacent to the granite where they commence. Instead, tourmalinization is regarded as preceding the intrusion of the pegmatites, which acquired boron by assimilation of country rocks.

Metasomation is regarded as having penetrated fractures and fissures, which occur principally in the brittle magnetite units. At De Vries Lake, uraniferous, tourmalinised zones occur in units with no magnetite at all, indicating that other fractures were used when available, and that metasomatism and magnetite remobilisation were not precisely coeval.

A suitable starting material for producing tourmaline would be kaolinite with minor goethite; addition of 10% B_2O_2 yields the composition of tourmaline.

RADIOACTIVITY

It was originally suspected that uranium mineralization at Jackpot was caused by the reduction of hexavalent uranium in groundwater by ferrous iron in magnetite, producing veinlets of pitchblende in magnetite pods:

$$UO_2^{2+} + 2\,Fe^{2+}(\text{magnetite}) - UO_2 + Fe^{3+}\ (\text{haematite})$$

This is not the case. All radioactive samples taken were magnetic, and most magnetic samples were radioactive, indicating a strong association between uranium mineralization and iron remobilization. However, uranium occurs as discrete pitchblende grains. These are up to 30 microns across, and hosted by psuedobrookite or, rarely, occur in isolation. Pseudobrookite and pitchblende are surrounded by reaction rims of anomalous chlorite, brown or blue-yellow pleichroic, which is itself rimmed by uraniferous rutile ("brannerite"). No whole rock analyses were carried out.

RARE EARTHS

Y occurs in the pitchblende, up to 3% by weight, or Y : U - 1 : 7 (atomic proportions). (Much higher Y contents have been reported in the literature, e.g. Palache, et al. 1944.) Nb is found principally in the pseudobrookite, up to 1.5% by weight. Other rare earths found are La, Ce, Nd, Sm and possibly Gd, which all occur in the pseudo-brookite, pitchblende or chlorite.

Xenotime may form up to 1% of the tourmalinised rock. It cannot be detrital in origin, since it occurs as loose granular aggregates. It does not appear to be radioactive, having no pleochroic haloes.

DISCUSSION

The source of the B and U is regarded as being the Snare rocks themselves, since these elements are common to the group. Pelites have the capability of absorbing metals, while illite has been shown capable of carrying up to 2000 ppm boron by absorption. As discussed, the granites and pegmatites are not regarded as likely sources of boron, nor of uranium, although they probably provide the requisite heat source. They may also have contributed metals of more local distribution, such as the rare earths at Jackpot. Similarly, De Vries Lake is notable for the presence of molybdenite in the deposits, while Mazenod Lake is primarily a copper-uranium prospect, and also has suites of Bi-Se-Te and Cu-Se-S minerals unique in Canada. The granite at Jackpot may contain up to 0.5% xenotime or monazite, but this is not uraniferous.

McGlynn (1970), reviewing metallic mineral deposits, reported Cs and a U-Th ratio of 1 : 1 at Jackpot. Cs was not found in this study, but may well be present. However, no Th was found, radiometrically or with the microprobe. This strongly implies a non-igneous origin for the deposit, since Th and U are mobilized together under igneous regimes, and are separated by the sedimentary cycle.

The high Ti content of the material at Jackpot (in ilmenite, rutile and pseudobrookite) is consistent with the idea that uranium may at some point have been absorbed by fine-grained TiO_2, before remobilised iron converted it to Fe-Ti oxides and the uranium became pitchblende.

The proposed paragenesis is therefore:

(1) Accumulation of ferruginous pelites in a basin, between the pre-existing Hepburn batholith and the developing Great Bear batholith.

(2) Adsorption of B by clays and goethite, and of U by clays, goethite and fine-grained rutile.

(3) Granite intrusion along the length of the basin;

   (a) Metamorphism of Snare sediments to paragneiss and biotite schist; reduction of geothite to magnetite; severe deformation, fracturing of magnetite horizons.

   (b) Remobilization of U and B into fractures; rare earths contributed; U possibly all adsorbed by rutile, or reacts to form brannerite; formation of tourmaline, xenotime, etc.

   (c) Remobilization of magnetite; brannerite or rutile reacts to form pitchblende with pseudobrookite, ilmenite.

(4) Intrusions of pegmatites; last phase of granite intrusion; last phase of boron metasomatism; precipitation of late sulphides (minor pyrite and chalcopyrite at Jackpot, molybdenite at De Vries Lake.

(5) Final minor tectonism; shearing; cessation of all activity.

CONCLUSIONS

Few of these deposits are currently regarded as having economic potential as uranium deposits alone. All have been explored at times, especially De Vries

Lake; Jackpot was investigated by a short adit and at least 24 drill holes. However, the deposits often have other elements of interest, such as the rare earths, Mo, Bi-Se-Te and Cu. Any future exploration should include a few multi-element analyses and careful mineralogical work to check this possibility. Uranium, boron and iron are universal to the group, being derived from the sediments, but other elements may come from the granites or are local peculiarities and thus unpredictable.

Any deposits of the "magnetic belt" should extend to depth, rather than just to the water table, as would have been the case had they been caused by the reduction of hexavalent uranium in groundwater by the magnetite.

As late Aphebian deposits, they should be viewed in the light of such areas as the Athabasca basin, where polymetallic uranium deposits are better known.

ACKNOWLEDGEMENTS

This work was carried out with the financial and logistical support of DIAND in Yellowknife, and the considerable help of all the staff. Noranda and B.P. Minerals, holders of Sue-Dianne and CAM/FC respectively, gave freely of their time, knowledge and equipment. Dr. R.D. Morton has been a constant source and help in ideas and laboratory techniques. Steve Launspach carried out the microprobe analyses at the U of A, without complaint despite the difficult suites of material.

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CHAPTER XIV PRELIMINARY REPORT ON THE CLAN LAKE VOLCANIC COMPLEX

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Mapping at a scale of 1:5000 was initiated in the Clan Lake area about 55 km north of Yellowknife, N.W.T. The rocks are of the Yellowknife Supergroup and are divided into the following map units (oldest to youngest):

1) felsic volcanics 1a) interbedded dacite and rhyodacite flows; dacitic pyroclastics and lesser rhyolite flows and epiclastics.
   1b) mainly epiclastic sediments - lahars, conglomerates, sandstones, pelites, with local rhyolite or rhyodacite flows.
   1c) rhyolite flow, flow breccia, crumble breccia and pyroclastics. (Vent facies).
   1d) interbedded rhyodacite feldspar phyric tuff and lithic tuff.
2) mafic volcanics - mainly massive and pillowed flows but also pillow breccias, pyroclastics and epiclastics.
3) greywacke - mudstone turbidites.
4) granitic intrusions.

A preliminary geological map is provided, (Fig. XIV-1).

The felsic pile, which has not been previously subdivided, is dominated by unit 1a, dacite and rhyodacite flows and pyroclastics. Unit 1b, epiclastic sediments, averages 1/2 to 3/4 km in apparent thickness in the southwest and central part of the pile but thins to 1/4 km in the northwest. Unit 1c, rhyolite flow and breccia, is only 1/4 to 1/2 km in apparent thickness in the northwest and a small lens to the west-southwest. Unit 1d, lithic and phyric tuffs, is preserved only in the northwest. The mafic volcanics have an apparent thickness of 1/4 to 3/4 km and overly the felsic volcanics mainly in the east.

Three main foliations have been identified in the supracrustal rocks of the area. An early foliation (S_1) predominantly in the felsic volcanics (but also locally in the turbidites) appears as west-northwest-trending, discontinuous, well-spaced segregations. Two later foliations in the turbidites, appear as a north-trending slaty cleavage in the mudstones (S_2A) and a northeast-trending fine pervasive cleavage in the sandstones (S_2B). Generally S_2A is younger than S_2B. A late fabric (S_2) in both the mafic and felsic volcanics, probably equivalent in time to the later ones (S_2A and S_2B) in the turbidites, is present as a north-northwest-trending pillow, clast, or mineral foliation and/or lineation.

Changes in facing directions, which cannot be related to observed foliations (S_1, S_2A, S_2B, S_2), suggest the presence of earlier structures. One example is a northeast-trending, overturned anticline in the southern part of the felsic pile which appears to be crosscut by the early foliation (S_1).

Trenches (about 15 encountered) and gossans were examined and their locations noted. These are not shown on the preliminary geological map (Fig. XIV-1)

Further work will be done in the summer of 1982 to:

1) complete mapping in the western and northern portions of the area.
2) solve problems arising from examining data collected in the summer of 1981.
3) further examine contact relationships between the volcanics and younger turbidites and the associated gossans.
4) examine granitic rocks in the northwest to determine their timing relationships with respect to deformation.

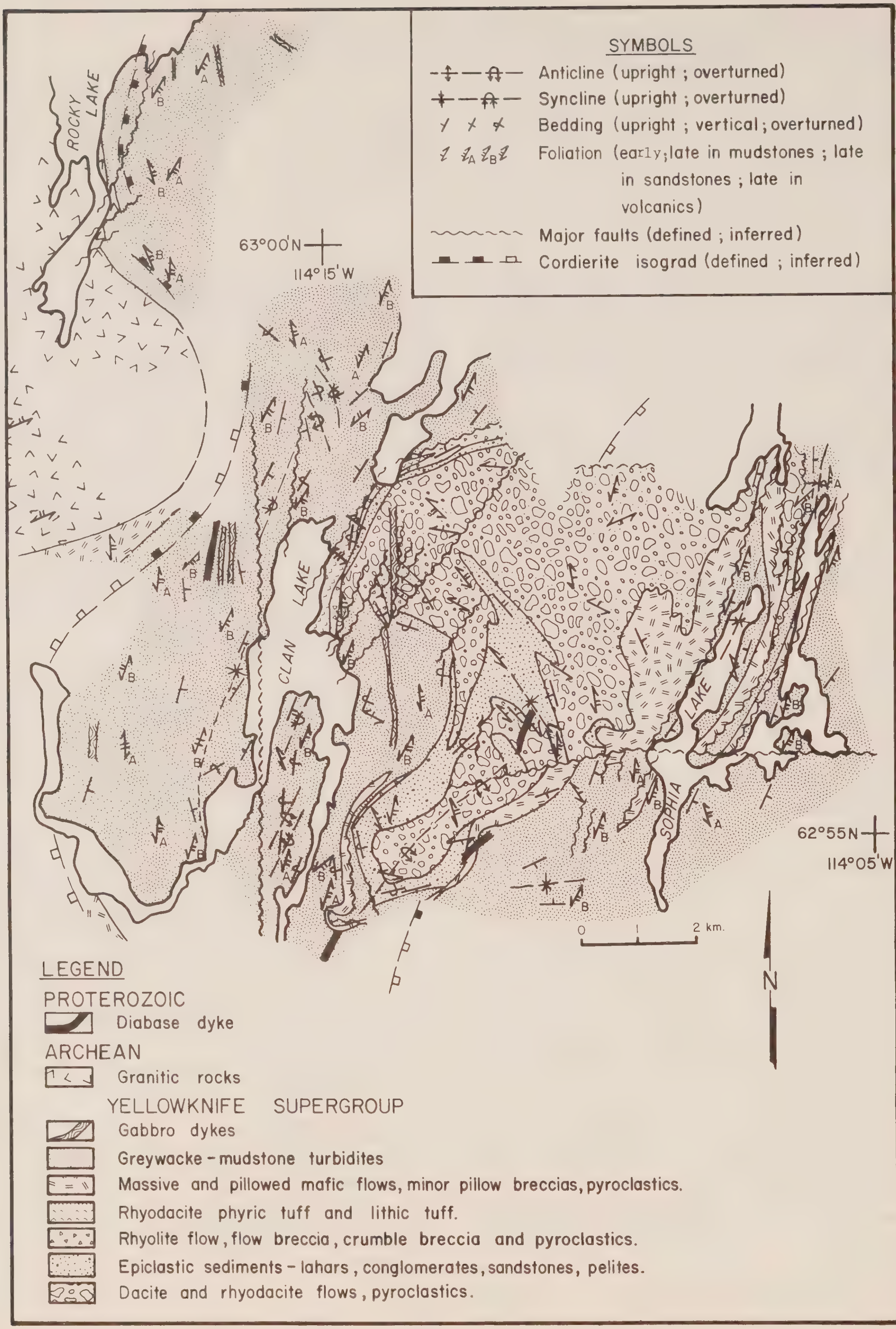

Figure XIV: Preliminary geological map of the Clan Lake Volcanic Complex, 85J/16.

A PRELIMINARY REPORT ON THE KESKARRAH BAY MAP AREA, SLAVE STRUCTURAL PROVINCE, NORTHWEST TERRITORIES (86H/2, 86H/6 AND 86H/7)

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INTRODUCTION

The Keskarrah Bay map area, which straddles Point Lake, 320 kilometres north of Yellowknife, Northwest Territories, includes parts of N.T.S. sheets 86H/2,6 and 7. Geological mapping at a scale of 1:31,680 was undertaken as part of an M.Sc. thesis to study in detail effects of metamorphism and deformation in the area. Support for the project has come from D.I.A.N.D. and a National Research Council of Canada grant to Dr. Toby Rivers of Memorial University of Newfoundland.

The map area is in the west-central portion of the Slave Structural Province (Fig XV-1). The Keskarrah Bay area has been mapped on a reconnaissance scale by Stockwell (1933), at 1:250,000 by Bostock (1980) and at 1:50,000 by Henderson and Easton (1977). Bau (1979) and King et al. (1980) have worked to the north and east of the area respectively. Easton et al. (1981a) mapped the basement gneiss and granitoid terrain to the west. Texas Gulf and Giant Yellowknife Mines have explored for gold in the metapelites and associated iron formation of the Contwoyto and Itchen Formations.

This report summarizes rock types, metamorphism and structure of the Keskarrah Bay map area based on field work done during the summer of 1981. Henderson and Easton's (1977) excellent map was used to delineate areas in which to conduct detailed work. Minor changes in the location of unit contacts were mapped and faults, isograds, and overall structure and metamorphism were further defined.

GENERAL GEOLOGY

The Keskarrah Bay map area is underlain by a sequence of Archean sedimentary and volcanic rocks of the Yellowknife Supergroup. The supracrustals lie in an extensive basin that is bounded to the west by a complex of gneisses, amphibolites and schists which unconformably underlie the Yellowknife Supergroup (Henderson and Easton, 1977; Easton et al., 1981b). A large body of granodiorite forms basement to the Yellowknife supracrustals and the unconformity is well exposed at Point Lake (Stockwell, 1933).

Mafic volcanic rocks, consisting of thinly-bedded mafic tuffs and pillowed to massive basaltic flows, mark the western margin of the basin and thin progressively to the east. Felsic volcanic rocks are less abundant and occur only in the central part of the map area.

Greywacke-mudstone turbidites, typical of Yellowknife Supergroup throughout the Slave Province, form the most extensive sedimentary unit in the area. In the Point Lake area these sediments are assocciated with thin- bedded iron formation. There is a progressive eastward thickening of these sediments away from the basin margin.

A conglomerate-sandstone unit, suggested by Henderson (1975) to have formed in a subaerial environment, is interbedded with the mafic volcanics and unconformably overlies the basement granodiorite.

The structural trend of the area is northerly,

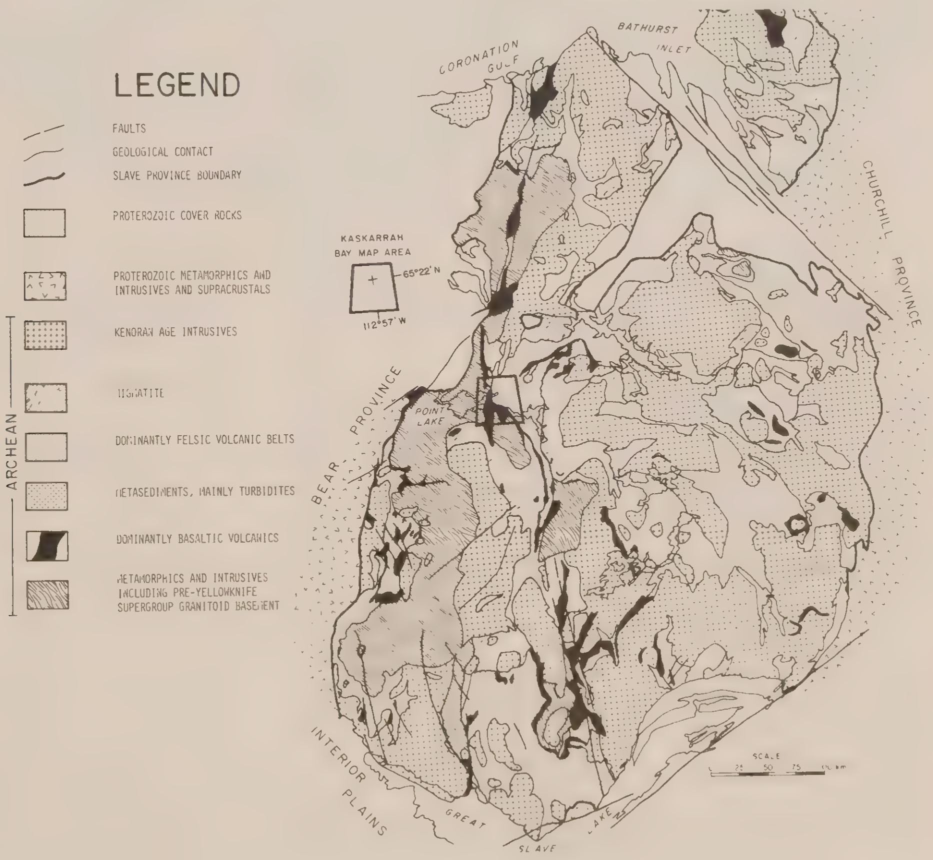

FIGURE XV-1: Geological map of the Slave Structural Province. The outlined area in the west-central part of the province is the Keskarrah Bay map area. After McGlynn (1977).

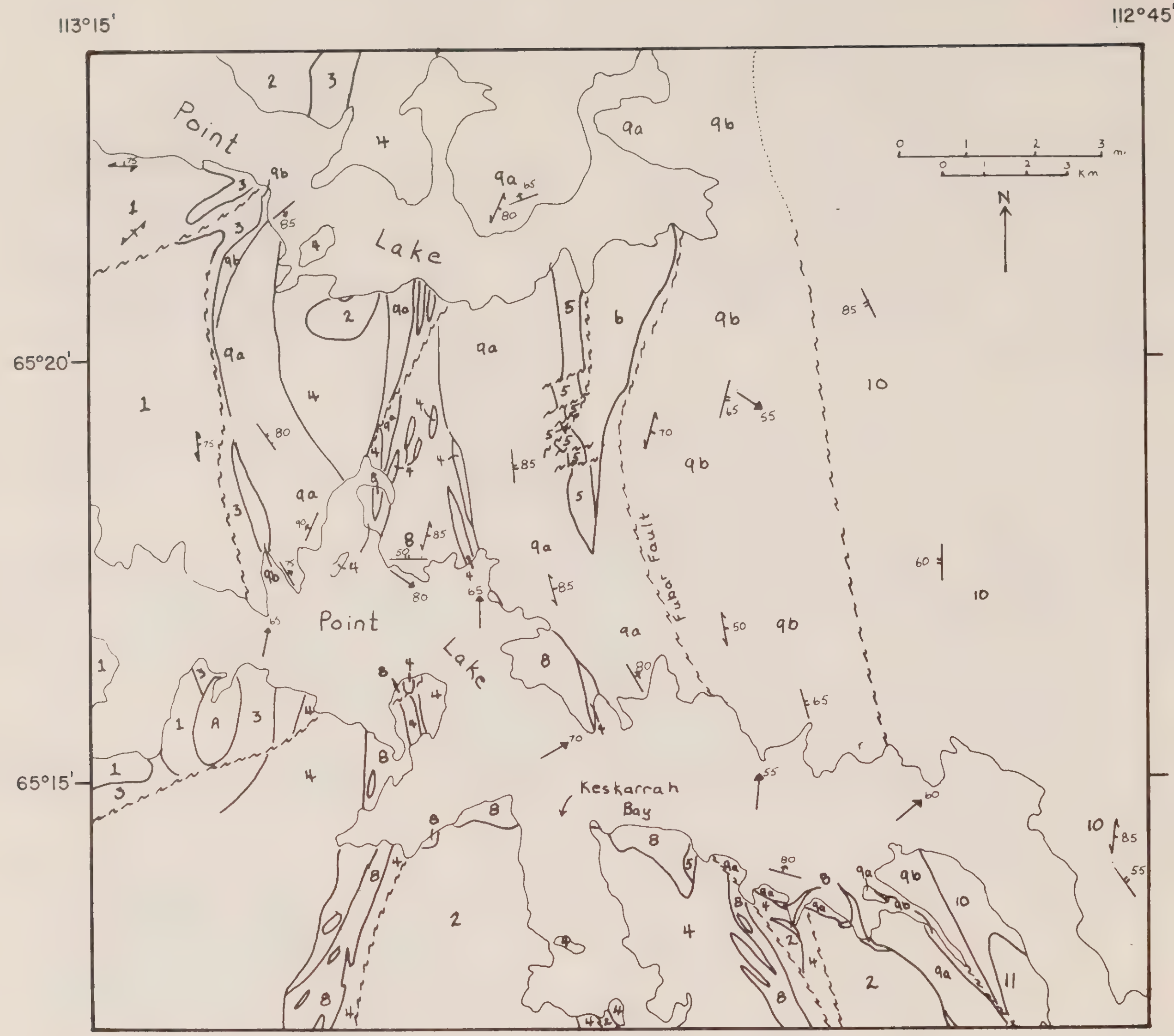

FIGURE XV-2: Generalized geological map of the Keskarrah Bay map area. After Henderson and Easton (1977). Legend opposite:

as is the trend of metamorphic isograds. The metamorphic grade increases outwards from the centre of the map area towards the east and west.

The Yellowknife Supergroup was deposited approximately 2665 Ma. ago (Henderson, 1980). A Rb-Sr whole rock age of 2408 + 46 Ma. dates the metamorphism of the Yellowknife Supergroup (Bostock, 1978). Krogh and Gibbins (1978) obtained U-Pb ages of 3155 Ma. and 2600 Ma. on zircons from basement granite and gneissic rocks in the Point Lake area.

UNIT DESCRIPTIONS

The rock types in the Keskarrah Bay area were described by Henderson and Easton (1977), hence unit descriptions will be kept relatively brief. Formational nomenclature is after Bostock (1980).

BASEMENT COMPLEX

Gneisses (1)

The western portion of the map area is underlain by a heterogeneous assemblage of orthogneiss, paragneiss and amphibolite. Easton et al. (1981b) suggest these rocks, in part, represent basement to the Yellowknife Supergroup. They have identified six units within the gneiss terrain, however, no subdivision of the gneiss terrain will be made here.

Medium-grained, hornblende-biotite tonalite to granodiorite orthogneiss is the most widespread rock type within the gneiss terrain. It is banded on a scale of 2 to 3 metres with light grey, medium-grained, plagioclase-porphyritic, chlorite-biotite-tonalite-granodiorite alternating with dark to medium grey, fine-grained, plagioclase-porphyroclastic hornblende-biotite-diorite. The tonalitic phase cross-cuts and contains 3- to 5-metre blocks of diorite. Eastwards along the north shore of the main peninsula on Point Lake, the gneiss is notably more thinly banded, contains more hornblende and biotite-rich layers and eventually culminates in a large "raft" of high grade sillimanite-cordierite-bearing pelitic gneiss. The leucosome phase of the tonalitic gneiss intrudes the metapelites and was subsequently deformed with the pelitic gneisses. The amount of pink, K-feldspar porphyritic granite to granodiorite within the gneisses increases eastward.

LEGEND

A	Granite, intrusive into Yellowknife Supergroup and gneiss complex.
11	Granite to pegmatite, intrusive into Itchen Formation.

YELLOWKNIFE SUPERGROUP

Itchen Formation

10	Psammitic to pelitic schists of sillimanite grade, with abundant pegmatite.

Contwoyto Formation

9a	Metagreywacke - mudstone turbidites (biotite grade and lower), associated with iron formation.
9b	Psammitic and pelitic schists (cordierite-andalusite-sillimanite-bearing equivalents of 9a) associated with iron formation.

Keskarrah Formation

8	Conglomerates and sandstone

Point Lake Formation

6	Rhyolite
5	Dacite
4	Basalts, massive to pillowed flows
3	Mafic tuffs

Basement Complex

2	Granodiorite
1	Mixed gneisses; orthogneiss, paragneiss and amphibolite.

* Unit 9c; iron formation and unit 7: calcareous metasediments can not be shown on the geological map of the area at this scale.

SYMBOLS

Geological contact

Fault

Bedding (tops known, unknown)

Foliation, gneissosity

F_2 fold axis trend (average from B-axis diagrams)

Legend for Figure XV-2.

Phases intruding the tonalite-granodiorite gneiss include equigranular, leucocratic, fine to medium grained granite, at least two phases of pegmatite, and mafic biotite-rich dikes. The earliest pegmatite is highly deformed and folded, and shows an augen or cataclastic texture. The second pegmatite is undeformed and cross-cuts the first. Easton et al. (1981) suggest that mafic dikes represent feeders to the volcanic pile. The gneiss contains enclaves and rafts of strongly foliated, uniformly thinly-banded (2-3 cm), highly folded gneiss consisting of hornblende-biotite tonalite, amphibolite, hornblende-gneiss, biotite quartz-feldspar gneiss and rare granitic gneiss layers.

Granitic gneiss is strongly foliated, fine to medium grained and comprises pink to red, leucocratic quartz-feldspar and green, chlorite-rich mafic bands. The quartz-feldspar bands have a well developed quartz ribbon texture and less commonly a feldspar porphyroclastic texture. The relationship of granitic gneiss to these rock types is uncertain, but it is interbanded with tonalitic-granodioritic gneiss and amphibolite.

Basement Granodiorite (2)

Massive, medium- to coarse-grained, chlorite-bearing granodiorite on the point immediately west of Keskarrah Bay and on the north shore of the main peninsula (Fig XV-2) is locally fractured with abundant epidote and chlorite veins. Along its margins it has been so intensely deformed that locally it is a quartz-eye mylonite. The granodiorite forms the basement to the supracrustals and where the unconformity is exposed conglomerate of the Keskarrah Formation has filled fractures and crevasses in the granodiorite. A paleoweathered zone occurs locally within the granodiorite. Highly deformed biotite-rich mafic dikes within the granodiorite represent feeders to the mafic flows. Younger diabase dikes have been deformed and altered only at their margins. The contact between granodiorite (2) and gneiss (1) is not exposed, but Easton and others. (1982) suggest that, in part, gneiss is younger than granodiorite. The granodiorite was dated at 3155 Ma. by Krogh and Gibbins (1978).

YELLOWKNIFE SUPERGROUP: POINT LAKE FORMATION

Mafic Tuffs (3)

Fine-grained, millimetre-thick beds of dark green mafic tuffs form a 100 to 500m-wide north-south-trending belt on the western side of the area (Fig XV-2). This is the Western Volcanic Belt of Bostock (1980). Bedding is defined by alternation of epidote, chlorite, actinolite and possibly hornblende-rich beds, with plagioclase and minor quartz-rich beds. Mafic beds 10 to 15cm wide contain subrounded, altered plagioclase aggregates (lapilli?). Actinolite may form spectacular radiating porphyroblastic aggregates in coarse-grained layers.

The mafic tuffs form a steep, eastward-dipping homocline that is in fault contact with gneisses (1) over much of its length. Bedding and foliation within tuffs trends subparallel to layering in gneisses. Easton and others (1982) report an uncomformity between mafic tuff and basement gneiss. Along the western margin of the unit, tuff is intruded by porphyritic to mylonitic granite-granodiorite (13 of Henderson and Easton, 1977).

Mafic Flows (4)

Massive to pillowed basalts are fine to medium grained, locally coarse grained, and contain minor carbonate-rich lenses. Weathered surfaces on flows of low metamorphic grade have a characteristic pale green color and are spotted with small chlorite or actinolite porphyroblasts. With increasing actinolite content or metamorphic grade, flows become progressively darker green. Weathered surfaces typically show a criss-crossed fracture pattern. Contacts are gradational between massive and pillowed flows. Pillows are generally stretched parallel to foliation so that top determinations are difficult to make. Minor folds are generally not observed within this unit. Mafic flows interfinger with Keskarrah Formation conglomerate. The contact with the Contwoyto Formation is locally marked by a 1-2m wide zone of reworked basalt. At one locality there is a 3-metre wide layer of white quartzite between basalt and overlaying metapelites.

Felsic Volcanics (5 and 6)

Units 5 and 6 correspond to the felsic volcanics of Henderson and Easton (1977) and comprise dacite and rhyolite respectively. In the east-central part of the map area they occupy a north-south-trending antiform (Fig XV-2). Felsic volcanics are thinly bedded (less than 0.5cm wide), strongly foliated and contain biotite and garnet. Dacite is white to grey and locally contains euhedral, pale green plagioclase phenocrysts. Rhyolite is white to light grey or banded pale pink and green with small black, angular micaceous fragments. Rare garnet-actinolite beds were noted.

Calcareous Metasediments (7)

Flanking and interlayered with felsic volcanics are lens-shaped bodies of brown- to grey-weathering, carbonate-rich metasediments. Bedding is defined by thin siliceous layers within the marble or by alternating bands of marble and calc-silicate with amphibole, biotite and garnet. Marble is interlayered and infolded with felsic volcanics and iron formation. At one locality, marble is interlayered with Contwoyto Formation sediments. Locally it is sheared along the contact with the volcanics.

YELLOWKNIFE SUPERGROUP: KESKARRAH FORMATION (8)

Unconformably overlying granitic basement and interfingering with mafic flows and pelitic rocks are conglomerates and sandstones of the Keskarrah Formation (8 and 9 of Henderson and Easton, 1977). The conglomerate is essentially bimodal; granodiorite forms the most conspicuous and largest clasts while fine grained, angular, green, chlorite-rich mafic volcanic clasts are smaller and less obvious. Volcanic clasts are highly deformed and may be mistaken for matrix. A small number of gneiss, chert, siltstone, quartz, iron formation and sandstone clasts are present. Easton et al. (1981) note layers rich in gneissic clasts, suggesting that intermittently the gneiss terrain was a source area. The conglomerate varies from a spectacular boulder conglomerate to a quartz pebble conglomerate. Cobble-sized clasts, sandstone beds and calcareous lenses are common. Contacts with mafic volcanics are usually sheared.

YELLOWKNIFE SUPERGROUP: CONTWOYTO FORMATION (9)

The Contwoyto Formation (10a, b of Henderson and Easton, 1977), as defined by Bostock (1980), consists of metamorphosed greywacke and mudstone turbidites containing discontinuous bands and lenses of silicate, sulfide or oxide facies iron formation. These turbidites are typical of Yellowknife Supergroup sediments within the Slave Province, although the association with iron formation is not universal. The Contwoyto Formation in the Keskarrah Bay area is divided into three subunits; biotite-grade or lower metagreywacke-mudstone (9a), cordierite-andalusite grade psammitic and pelitic schists (9b) and iron Formation (9c).

Greywacke-mudstone turbidites west of the Fubar Fault (Fig. XV-2) are generally fine grained and dark grey but are locally green, presumably due to a relative increase in the volcanic component. Graded bedding, the abundant primary structure, is on a scale of 15 centimetres or less but in coarser grained phases individual beds are up to 30 centimetres wide, and a basal quartz wacke to quartz pebble conglomerate layer grading upward into mudstone may be present. Other primary structures include load casts, ball and pillow, scour and fill and flame structures. Thin pebble-rich layers are rare. Biotite, chlorite and muscovite are the main metamorphic minerals. Minor folds are abundant within the unit.

There are two belts of turbidite separated by the mafic flow unit (Fig. XV-2). In the central part of the map area turbidite is in fault contact with schist (9b). On the south shore of Point Lake the contact may be gradational but pegmatite and felsic volcanics obscure its nature. Western exposures of turbidite (9a) near the gneiss-greenstone contact, appear to grade westward into schists (9b). Iron Formation (9c) is abundant in the central exposures of turbidite (9a), but lacking in the western exposures. In the centre of the map area, immediately east of the Fubar Fault, schist (9b) is characterized by cordierite and andalusite (chiastolite) porphyroblasts. Unit (9b) is coarser grained and lighter in color (brown-grey) than the turbidites. Cordierite first appears as elongate knots, up to 1 and 2 centimetres long, that are locally elongated down the dip of bedding planes but are more commonly randomly oriented within this plane. Chiastolites form euhedral pink porphyroblasts with well defined internal inclusion patterns and reach a maximum length of 7 centimetres. Biotite is coarser grained in schist than turbidites and locally form 2 to 3 millimetre elongate porphyroblasts. Matrix comprises fine-grained biotite, muscovite, quartz, feldspar and possibly chlorite. Sillimanite (fibrolite variety?) may appear as 5-millimetre diameter porphyroblasts or as rims on cordierite and chiastolite in easternmost exposures. Positive identification has yet to be made.

Metamorphism commonly has reversed the grading of the beds. Cordierite porphyroblasts are absent or rare in basal psammitic layers but in upper pelitic layers are very abundant. Chiastolite has formed in the uppermost pelitic layers. Minor folds as well as primary sedimentary structures are sparsely developed.

Silicate, sulfide and oxide iron formation is found within the Contwoyto Formation, mainly as discontinuous layers and lenses, but a few of the thicker beds can be traced for as far as 2 kilometres. At low metamorphic grades within turbidites (9a), iron

formation is a distinctive red slate. The slate, which is associated with siliceous layers rich in white to grey chert nodules, forms bands less than a few centimetres to over one metre in thickness. Oxide facies iron formation within turbidite (9a) consists of thinly bedded, blue-grey, magnetite-rich layers alternating with magnetite-rich mudstone or siltstone and quartz-rich layers.

With increasing metamorphic grade pink to purple garnet, actinolite and grunerite are concentrated in layers and lenses adjacent to and within iron formation. Garnet may constitute over 50% of such layers. Rusty, sulfide-rich gossans are common within schists (9b), but less common within turbidites (9a). The contact between Contwoyto Formation and felsic volcanics (5 and 6) is marked by sulfide-rich iron formation.

YELLOWKNIFE SUPERGROUP: ITCHEN FORMATION (10)

According to Bostock (1980) the Itchen Formation is the metamorphic equivalent of greywackes and mudstones of the Contwoyto Formation but lacks in iron formation. Itchen Formation metapelites resemble Contwoyto turbidites. They are brown to grey in color with porphyroblasts of sillimanite, commonly pseudomorphing cordierite and chiastolite, in a medium-grained quartz, feldspar, biotite, and muscovite matrix. Some cordierite and chiastolite porphyroblasts have sillimanite rims, others do not.

The metapelites (10) are well bedded, but other primary structures are lacking. Individual bed thicknesses are greater than those observed in the Contwoyto Formation. Metamorphically reversed graded bedding is common. Rusty, sulfide-rich gossans are rarely observed. Minor folds are uncommon within the unit.

Pegmatite and Granite (11)

Pegmatites (11a), 100 to 300 metres in width and up to 1 kilometre in length, intrude Itchen Formation sediments. Small pegmatites intrude the Contwoyto Formation, but always near the contact with the Itchen Formation. Pegmatites (11a), in sharp contact with sediments, are undeformed, white, and consist of plagioclase, quartz, muscovite and tourmaline. Pegmatite veins less than 10 centimetres wide intrude sediments in abundance near some of the larger pegmatites. Coarse pegmatitic textures are abundant. Gradations to both medium-grained equigranular and medium- to coarse-grained graphic intergrowths between plagioclase and quartz can be seen. Local, pink, K-feldspar zones have indistinct boundaries with more typical quartz-plagioclase pegmatites. A small body of pink, medium-grained, equigranular granite (11b) with quartz-plagioclase graphic intergrowths intrudes the Itchen Formation. The large granite in the southeast part of the map area is included in unit 11b as it has comparable texture and mineralogy. This granite is in fault contact with Contwoyto and Itchen Formations.

The relationship of pegmatitic and granitic bodies to Itchen Formation sediments is uncertain. Concentration of these bodies is coincident with an increase in metamorphic grade in metapelites. The possibility that pegmatites and granites may represent a partial melt of surrounding metasediments forms the basis of a B.Sc. thesis being prepared by D. McKinnon.

Diabase Dikes

Unmetamorphosed diabase dikes of the Mackenzie Dike Swarm intrude all units within the map area. They have red-brown weathered surfaces, are equigranular, fine to medium grained and contain plagioclase, pyroxene and minor magnetite. Dikes are steeply dipping to vertical and may exhibit an igneous layering.

STRUCTURE

The dominant structural trend throughout the supracrustals is north to northwesterly with northeasterly dips generally in excess of 60° (Fig XV-2). Within gneisses extending west from the western part of the map area, the dominant trend is easterly. This trend becomes more northerly as the mylonite zone, which separates gneisses and supracrustals, is approached. Structural interpretations are hampered by lichen cover on inland outcrops, hence the majority of inferences on structural history have been made from wave and ice scoured outcrops on Point Lake.

FOLDS, FOLIATIONS AND LINEATIONS

At least three folding events are evident in the gneiss terrain. The first is inferred in that a gneissic layering was present in the rocks prior to the second and third deformations. Easterly trending structures, most prominent in the western map area, are refolded about northeast to north trending axes of third phase folds. Such folds have a weak axial plane foliation defined by alignment of biotites. Fold axes plunge from 20° - 55° and trend from 025° in the east to 070° in the west as the north-trending mylonite zone is approached. Adjacent to and within the mylonite zone, foliations are northerly. The third folding may have culminated in the formation of this mylonite zone. Cataclastic deformation has locally affected the gneisses producing tonalitic to granitic gneiss containing angular plagioclase porphyroclasts in tonalitic to granodioritic gneiss and K-feldspar porphyroclasts in granitic gneiss.

Within basaltic flows (4) foliations are generally parallel to bedding trends, and minor folds are rarely observed. Mineral lineations and small-scale crenulations plunge easterly to southerly, down the dip of northerly-striking bedding planes and foliation traces. Foliations within the Keskarrah Formation conglomerate are northerly trending, with mafic volcanic clasts strongly elongated in the plane of foliation. Granitic clasts throughout most of the formation appear undeformed, however, in the axial zone of major folds and along the contact with basalts, these clasts are elongate parallel to foliation. Locally, in such intensely deformed zones, conglomerate is sheared into a paper-thin schist with only a few granitic clasts remaining. The long axes of clasts plunge steeply to the north or vertically within the plane of foliation. Scattered quartz wacke and calcareous lenses and beds mark major and minor folds where the bedding trace is at an angle to foliation.

Minor folds are abundant in the Contwoyto Formation at low metamorphic grade and bedding is well preserved. Bedding, which is generally east facing, and foliation trends range from north-northwest to northeast. Within the easternmost outcroppings of Contwoyto Formation, the most prominent folds are northeast plunging, tight asymmetric folds with a consistent 'S' sense. The folds, which plunge from 050°-070° to vertical, are overturned to the west with steep to moderate easterly-dipping limbs. Axial plane

cleavage is defined by either parallel orientation of micas or a fracture cleavage. It is variable in development but generally nonpenetrative and is usually present only in hinge zones. It is well developed in shaly beds and poorly defined in greywacke beds. Flame structures are exaggerated into parallelism with cleavage in greywacke beds. Typically, minor folds are sheared and offset parallel to the axial plane. The sense of offset is always right lateral so that an overall 'S' sense is retained.

Within westernmost outcroppings of Contwoyto Formation turbidites (9a), sedimentary structures indicate the predominance of easterly-facing beds. To the north a synform is well defined. Along its hinge and to the south, top directions flip from east to west with no apparent pattern and fold closures are rarely observed.

On the basis of evidence to be presented below, an earlier, tight to isoclinal folding is postulated so that the northeast plunging folds just described represent second phase structures. Indications of an early phase of deformation in supracrustals include: (a) juxtaposition of opposing bedding-facing directions; (b) a mica foliation or slaty cleavage parallel to bedding throughout the area; (c) axial plane cleavage developed in the hinge zone of second phase folds crenulating a pre-existing foliation; (d) isoclinal intrafolial folds refolded about northeast trending fold axes and (e) small isoclinally folded quartz veins refolded in the hinge zones of second phase folds.

Broad, open warps in bedding or foliation planes or both were produced by a third folding. Third phase folds have moderate to shallow east plunges, except for shears and offsets parallel to axial planes and a weak crenulation of earlier fabrics parallel to fold axes. This phase of folding is reflected in warps of axial traces of major folds and variation of bedding and foliation trends along strike from northwest to northeast.

Contoured stereograms, in which bedding-plane intersections are plotted (B-axis diagram), define a maximum corresponding to the axis of second phase folds. This fold axis, which plunges steeply in the west and moderately in the east, is of variable trend but always lies within a north-to northwest-trending plane. Significant dispersion of bedding-plane intersections outline a north trending girdle. This dispersion is the result of gentle folding about an easterly-trending axis by third phase folds.

Lineations within turbidites (9a) correspond to bedding-cleavage intersections and parallel north-to northeast-trending, second-phase fold hinges. Shallow north to northeast lineations are indicative of later horizontal to sub-horizontal movement along bedding and foliation surfaces. These lineations may be related to deformation associated with third phase folds.

East of the Fubar Fault, bedding and foliations within schists (9b) are mutually parallel and have a northerly trend. Minor folds are not abundant but major folds have been documented. Folds are inferred where bedding-foliation intersections and easterly trends of bedding are observed, but these structural relationships cannot yet be correlated with a major structure. The most prominent structure within schist (9b) is a mineral lineation defined by biotite and cordierite, which plunges easterly about 60° down the dip of bedding planes.

Similarly, the Itchen Formation does not contain abundant minor folds. Though bedding characteristically dips and faces to the east, westerly facing beds possibly reflect isoclinal first-phase folds. Bedding traces in the extreme southeast of the map area (King and others ., 1980) define an open synformal structure with an 'S' sense. The mineral lineation observed in Contwoyto turbidites is not well developed in the Itchen Formation. Sillimanite knots are commonly lineated but are rarely aligned in a foliation that cross-cuts bedding.

FAULTS

Three prominent northerly-striking faults cross the Keskarrah Bay map area (Fig XV-2). The westernmost fault is a steeply dipping to vertical mylonite zone along the gneiss-greenstone boundary. Within the mylonite zone the rock is salmon-colored, leucocratic, fine grained and thinly foliated with a quartz ribbon texture. Henderson and Easton (1977) mapped a body of granite to the south, along strike with the mylonite zone. This granite intruded along the gneiss-greenstone boundary prior to or during mylonitization and now comprises the salmon-colored rock within the mylonite zone . Intrusive contacts are observed between granite and tuff and, although deformation has been intense along these contacts, tuffs are little affected by mylonitization. Thin chlorite-rich shear zones are noted within tuffs near the mylonite. Easton and others (1981a) report northerly-trending, 1- to 5-metre wide mylonite zones in the gneiss terrain.

The Fubar Fault zone strikes northerly through the centre of the map area (Fig. XV-2). It is 10 to 30 metres wide and over most of its length separates low-grade Contwotyo (9a) sediments from higher-grade (9b) equivalents. Immediately west of the fault zone bedding within biotite grade sediments has been disrupted. Graded bedding is still preserved but has been broken into less than 2-cm blocks and folded into 'S'-type asymmetrical folds.

A third, northerly-striking fault separates the Contwoyto Formation from the Itchen Formation (Fig. XV-2). The fault shows up as a prominent lineament on aerial photographs. Bedding in Contwotyo Formation sediments is disrupted near the fault.
Rocks within the fault zone are pale green, fine grained and silicified. Altered rocks extend out to about 0.5 kilometres on either side of the fault.

Late, easterly-trending faults offset northerly-striking units. Rocks within fault zones are extremely sheared and commonly contain abundant calcite and sulfides. Third phase, east-trending folds and late faults may be related to the deformational event.

SUMMARY

The gneiss terrain has been affected by at least three deformational events. Two of these are not apparent in the supracrustal terrain. One produced a gneissic fabric and the other the easterly-trending folds. Both the gneisses and the Yellowknife Supergroup have been folded about north-trending axes in a deformational event which produced the predominant fold structures and main fabric in the area. An earlier but post-gneiss period of isoclinal folding is also noted in Contwoyto Formation metaturbidites and

the entire supracrustal succession has been affected by late, east-trending folding which produced a warping of second phase axial traces, unit contacts and major northerly trending faults. East-trending faults and shear zones are associated with the last phase of folding.

METAMORPHISM

Discussion of metamorphism is based on metamorphic mineral assemblages observed in the field. For this reason isograds are outlined only for metapelitic units on Figure XV-3 and are approximate.

Several periods of metamorphism are evident in the basement gneiss complex (1) and further work is neccessary to define each event. An early amphibolite facies metamorphism, possibly accompanied or pre-dated by partial melting, is overprinted by a chlorite-grade event.

In the Keskarrah Bay map area supracrustals are below upper amphibolite facies of regional metamorphism. Basaltic flows (4) and Keskarrah Formation conglomerates and sandstones (8) have been metamorphosed to greenschist facies; basaltic flows contain epidote, chlorite and actinolite and Keskarrah Formation sediments (8) chlorite and muscovite. Mafic tuffs (3) are similar in mineralogy to the flows, but hornblende may be present near the contact with the gneisses. Metapelites of the Contwoyto (9) and Itchen Formation (10) contain metamorphic minerals that indicate a progressive rise in metamorphic grade, from greenschist to middle amphibolite, both to the east and to the west of the central part of the map area. Further discussion on metamorphism in the area is restricted to metapelites.

METAMORPHISM OF THE METAPELITES

There are two belts of metapelitic rocks in the Keskarrah Bay area (Fig XV-2). In Eastern exposures of the Contwoyto Formation (9) the metamorphic grade rises to the east from sub-biotite to biotite (9a) to cordierite, andalusite and sillimanite (9b). The Itchen Formation (10) also contains cordierite, andalusite and sillimanite, but sillimanite becomes progressively more abundant towards the eastern edge of the map area. In the west area metapelite grade increases westerly from sub-biotite through biotite to cordierite or andalusite. Both andalusite and cordierite appear in some rocks, but sillimanite has not been observed. Maximum metamorphic grade in these units is recorded by the first appearance of sillimanite coexisting with muscovite and quartz. Staurolite has not been recorded in metapelites, reflecting the overall Fe-poor bulk composition of rocks. Metamorphism is low pressure Abukuma type (Miyashiro, 1973).

Within turbidites (9a) a biotite isograd can be roughly defined, based on the appearance of millimetre-diameter or less biotite porphyroblasts. Location of this isograd, now approximate, will be better

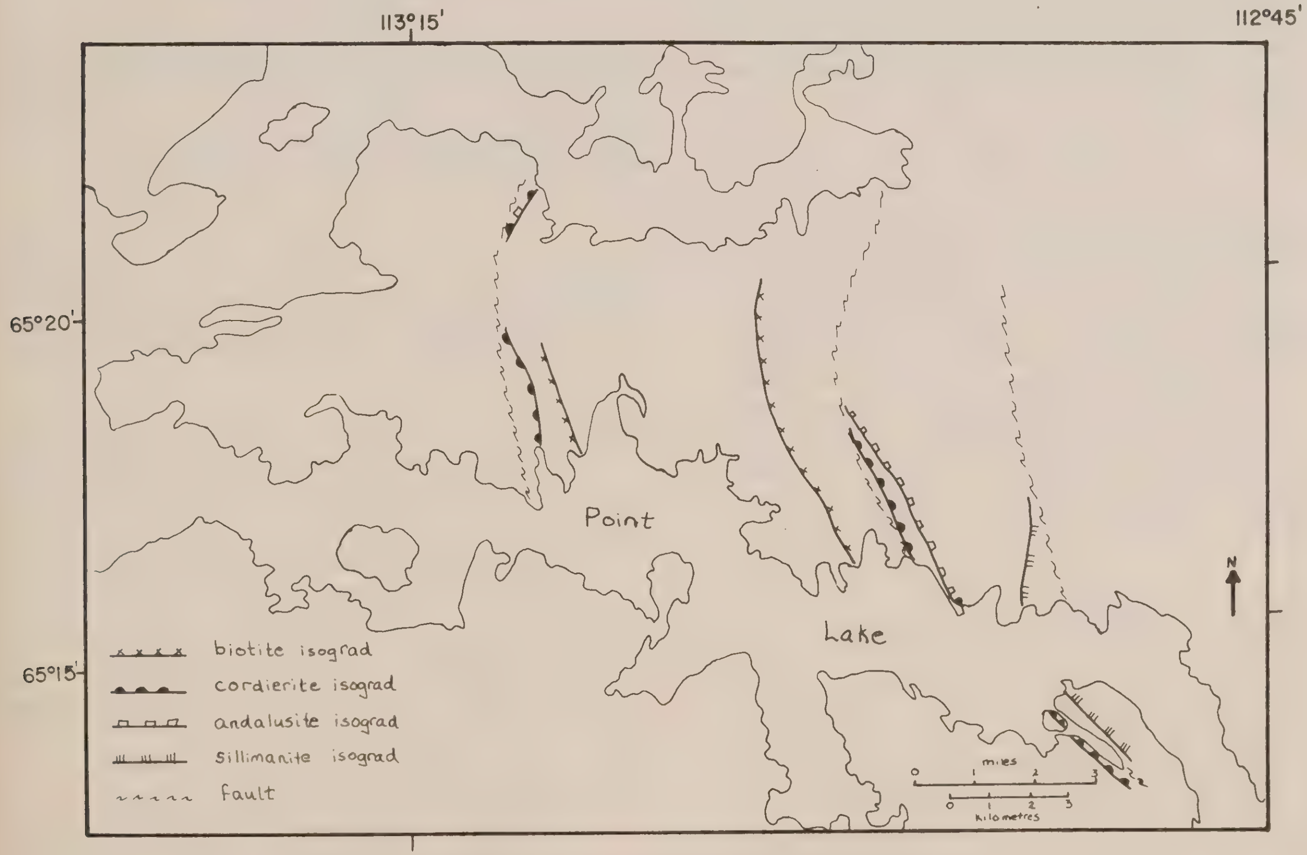

FIGURE XV-3: The distribution of metamorphic isograds in the central Keskarrah Bay map area.

delineated through petrographic work. Below this isograd, chlorite and muscovite are the characteristic minerals. Above the biotite isograd biotite coexists with chlorite and muscovite, and there appears to be no increase in grain size corresponding to the first appearance of biotite.

Contwoyto Formation psammitic and pelitic schists are defined by three criteria: (a) the sudden appearance of cordierite and chiastolite porphyroblasts; (b) an increase in abundance and grain size of biotite porphyroblasts and (c) an overall coarsening of the grain size. Winkler (1976) uses the first appearance of cordierite to, in part, define the boundary between low and medium grade metamorphism. King and others (1980) established that within Itchen Formation Sediments cordierite forms before andalusite. Thompson (1978), however, indicates that both cordierite and andalusite appear at the same time in the Point Lake area. Based on field observations, the distribution of cordierite and andalusite in the Contwoyto Formation indicates formation of cordierite before andalusite.

Sillimanite first appears within schists (9b) as fine-grained aggregates and as rims around cordierite. The first appearance of sillimanite marks the sillimanite isograd as delineated in Figure 3. The Itchen Formation (10) is within the sillimanite zone of medium-grade metamorphism (middle amphibolite facies), although low-grade "pockets" of cordierite-andalusite zone rocks may be defined with further work. Cordierite and andalusite coexist with sillimanite over much of the area that is underlain by Itchen metapelites. The sillimanite rims and pseudomorphs both andalusite and cordierite and also forms discrete patchy aggregates. Where andalusite and cordierite are absent, sillimanite is prismatic and forms lineated knots about one centimetre long.

ECONOMIC GEOLOGY

The Contwoyto and Itchen Formations have been explored for Gold by Texas Gulf and Giant Yellowknife Mines. Iron formations have been prospected for gold and Bostock (1980) has described gold showings. Henderson (1975) reports sphalerite-galena-chalcopyrite showings in mafic volcanics (4). Spectacular magnetite rims and interstitial magnetite are noted in pillow basalts near this base metal showing. Sulfides are disseminated in fault zones within the map area. Molybdenite and chalcopyrite occur in tonalitic to granodioritic phases of the gneiss complex on the north shore of the large peninsula and specular hematite is present in and near the mylonite zone on the west side of the area.

DISCUSSION

RELATIVE TIMING OF METAMORPHISM AND DEFORMATION IN THE SUPRACRUSTAL SUCCESSION

Relative timing of metamorphism and deformation in the supracrustal succession is deduced from observations in the greywacke-mudstone turbidites. Little metamorphic mineral growth accompanied the first phase of deformation. In Contwoyto Formation sediments a weak, non-penetrative axial plane cleavage to first-phase isoclinal folds is defined by alignment of micas. Peak metamorphic conditions were attained during the second deformation, which formed northerly-trending major structures, isograds and pervasive regional foliation. In low-grade metasediments biotite porphyroblasts define a weak foliation, whereas above the cordierite isograd rocks are well foliated and biotite and cordierite porphyroblasts are lineated down the dip of bedding or foliation planes. Sillimanite porphyroblasts may be lineated and may define a foliation. Andalusite porphyroblasts are randomly oriented, indicating that metamorphism outlasted deformation. There is no fabric associated with third-phase folds.

The Fubar Fault and the fault to the east, which separates Itchen and Contwoyto Formations, post-date the metamorphic isograds, but pre-date the last phase of folding.

REGIONAL CORRELATIONS

Henderson and Easton (1977) discuss the striking similarity between the geology of the Keskarrah Bay and Yellowknife areas. Although a physical correlation between various formations cannot be made, there are indications that "similar sedimentalogical and volcanological events were taking place in similar environments in the two areas." (Henderson and Easton, 1977, p. 221).

The western margin of the map area is underlain by gneisses that probably represent basement to the Yellowknife Supergroup (Easton et al., 1982). East-west-trending structures within gneisses swing to a northerly orientation as the gneiss-greenstone contact is approached. Gneisses are overprinted by the northerly regional trend in the supracrustals.

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CHAPTER XVI

PROGRESS REPORT ON PLACER GOLD ON THE LIARD RIVER N.W.T.

C. LORD
NAHANNI DISTRICT GEOLOGIST

During the 1980 field season the writer did an initial study of the distribution of placer gold on the Liard River system. This report describes the method used, general geology and results. The area studied was along the Liard River from the British Columbia-NWT border to Fort Simpson. (Fig XV1-1.)

Transportation on the river was by a 30 ft river scow powered by two 20 hp Mercury outboards. Supplies and gasoline were obtained from Fort Simpson, Nahanni Butte and Fort Liard. Data was plotted on 1:250,000 scale topographical maps 95 B,G and H. Samples were assayed for gold content at the Federal Assay Office, Yellowknife.

Acknowledgements

The writer is indebted to E. Linberg who provided much of the initial enthusiasm and reports,D. Turner for support and ideas, the people of Fort Liard and L. Woolley of Mackenzie Marine for mechanical advice and maintenance of outboard motors.

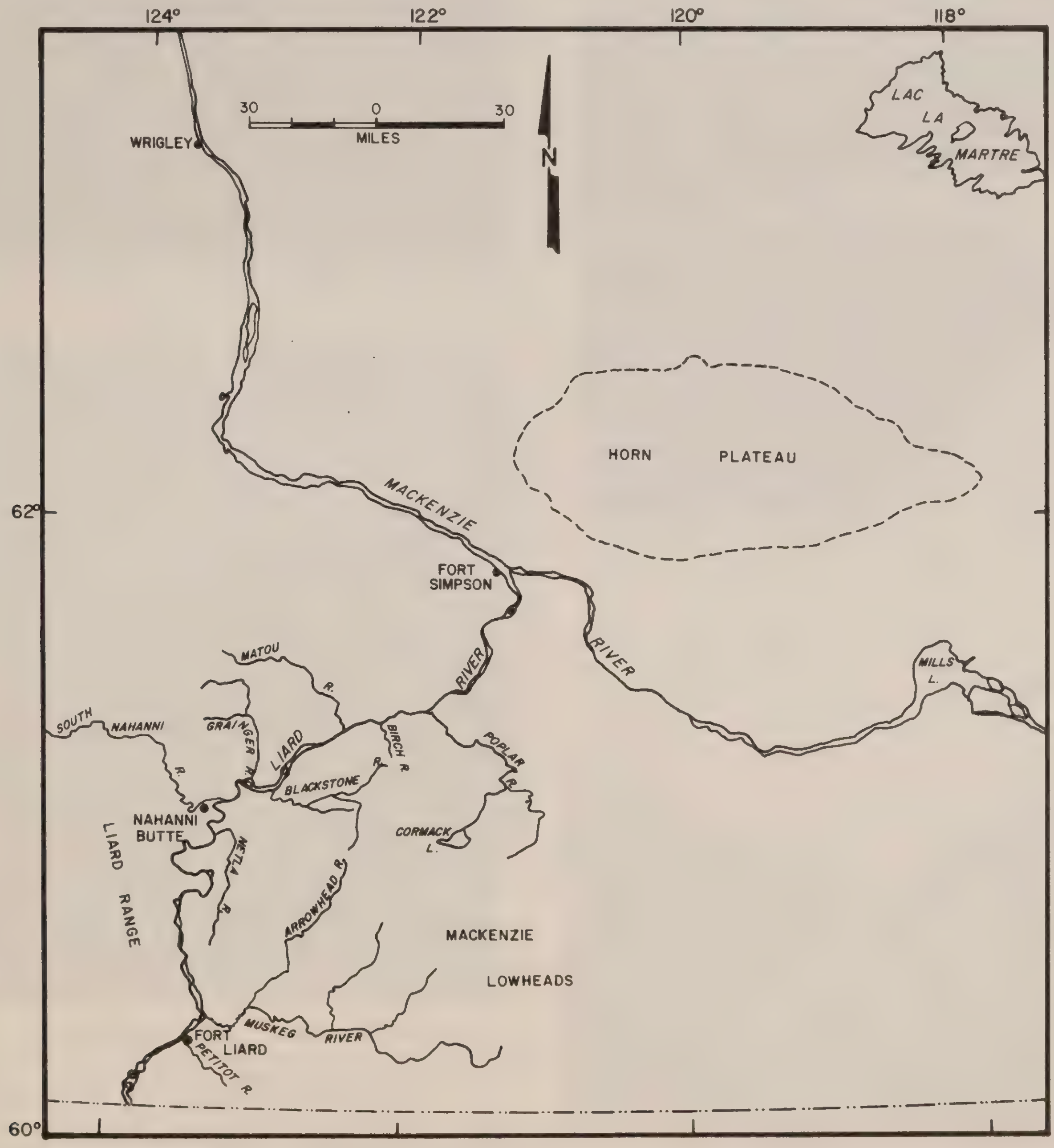


FIGURE XVI-1: Liard River System - N.W.T.

Previous Investigations

Placer gold has been mined from the Liard River since the early thirties when Ole Linberg and partners reportedly recovered 3 oz's of gold from a gravel bar just south of Nahanni Butte.

Willy McLeod of Fort Liard recalls panning gold from a gravel bar a few miles upstream from Petitot River during the thirties depression and Gus Kraus had found fine gold on the island at Fort Simpson.

In the early thirties Big Charlie, a Fort Liard trapper, reportedly found a nugget from the headwaters of Beaver River that was used to decorate the local bishop's fob chain. This and similar stories have not been substantiated.

FIGURE XVI-2: Confluence of Liard River at Fort Simpson.

Physical Geography

Physical character of the land surrounding the Liard River resulted from a combined action of water erosion and deposition and glacial activity.

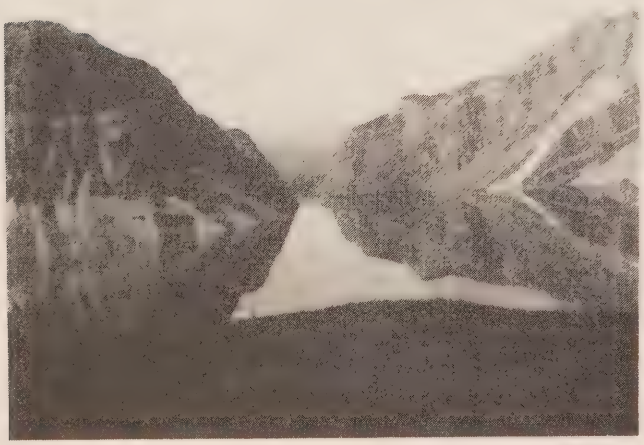


FIGURE XVI-3: Little Doctor Lake formed by ice pushing through the Front Ranges.

Liard floodplain is bordered to the west by the Mackenzie Mountains and to the east by the gently undulating Mackenzie Lowlands. The general

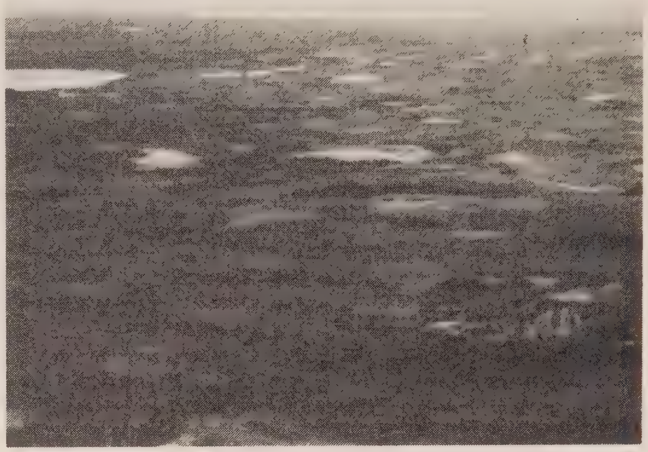


FIGURE XVI-4: Interior Plains.

floodplain level is at 1000 feet whereas peaks of the Nahanni and Liard Ranges rise to 5000 feet above sea level. Rocks of the Liard Range are predominantly Carboniferous sandstones, shales, cherts and limestones whilst those of the Nahanni Range comprise Silurian to Devonian carbonates.

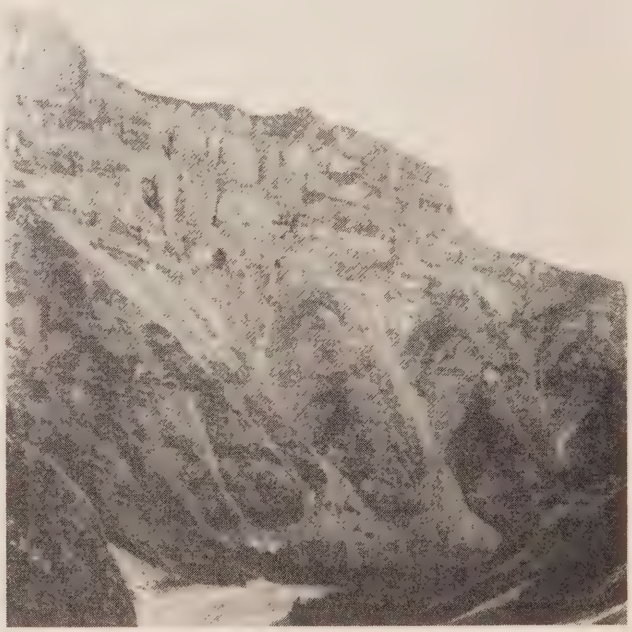


FIGURE XVI-5: Nahanni Gorge - Nahanni Range.

The flat to gently rolling Mackenzie Lowlands are composed of glacial deposits mainly drumlinoid ridges and fluted glacial tills, through which flow a number of tributaries to the Liard namely the Poplar, Birch, Matou, Blackstone, Rainger, Netla, Muskeg and Petitot rivers. These are characterised by well developed meanders, ox bows and gravel bars.

The South Nahanni is the major river feeding the Liard from the mountains. This is a river of braided channels typical of shallow melt waters laden with sediments.

FIGURE XVI-6: Splits - South Nahanni River.

FIGURE XVI-7: Nahanni Ranges.

The Liard River between the British Columbia border and Flett Creek is heavily braide' and has many mid-channel islands and smaller gravel bars.

Between Flett Creek and Blackstone River the Liard has well developed meanders with few islands and bars. Well defined old channel bars and meander scars are evident along both banks in this region.

Downstream from the Blackstone the Liard has a straight eastward course to Fort Simspon and flows through steep banks which rise to a 100 feet or more above the river's surface.

FIGURE XVI-8: Longreach - Liard River.

Both recent and older floodplain terraces are present throughout the Liards' course but are more common from the British Columbia border to the Blackstone.

There are two sets of rapids; those opposite Flett island are only noticeable at low water levels, another set about 51 km upstream from Fort Simpson are turbulent at all water levels.

Water Levels and Sedimentation

The Liard generally freezes over in November when the flow rate is between 11k to 13.5k cu.ft.sec. Prior to freeze up the water levels are low and many point bars and extensive gravel bars are exposed.

Break up is in May when the flow rate increases to 60k - 80k cu. ft. sec. In June, high moutain run off creates a surge in water levels and the flow increases to 250 to 300k cu. ft. sec. Throughout the summer months flash floods, rain storms etc, cause water levels to fluctuate dramatically with peak flows of 571k cu. ft. sec. being recorded. (P. Woods pers. comm.)

Since 1972, Water Survey of Canada have recorded sediment content at the confluence of the Liard and Mackenzie Rivers. This averages 48 million tonnes of sediment per year, a daily average of 131,000 tonnes.

An interesting point is that the Mackenzie at Arctic Red records 110 million tonnes of sediment, the Liard system contributing almost half of this load.

General Geology

The Liard floodplain covers parts of the Liard Plateau of the eastern Cordillera and the western part of the Interior Plains. (Fig XV1-9).

The Liard Range to the west is bordered on the east by the Liard fault a west dipping thrust that extends the whole length of these front ranges from

Nahanni Butte to south of Fort Liard.

Carbonates and fine-to coarse-grained clastics of the Mattson Formation form the main outcrops. These rocks have been folded into gentle anticlines and synclines. East of a line from Nahanni Butte to Fort Liard, outcrops are rare; the country being covered with thick glacial outwash and till and for several miles from the river, laced with abandoned channels and densly covered with trees and bush. Outcrops of Cretaceous shales, sandstones and limestones are exposed in creeks and gullies, and are either flat lying or have been deformed into large open folds. (Fig XV1-10).

FIGURE XVI-9: Liard Range from the river.

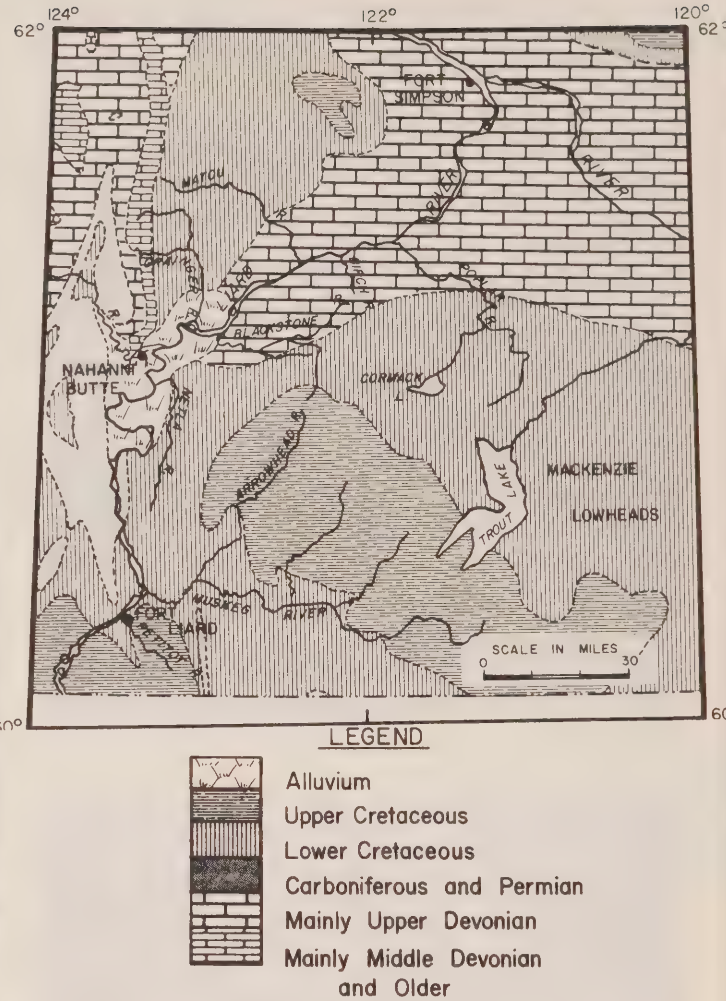
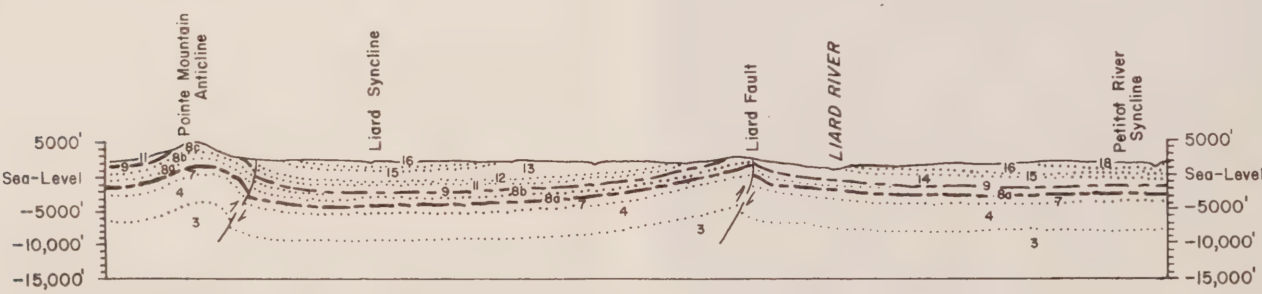


FIGURE XVI-11: Geological map - Liard River



LOWER CRETACEOUS
FORT ST. JOHN GROUP (10-16)
SIKANNI FORMATION (15-16)

16 Dark grey, concretionary shale, gypsiferous in part

15 Grennish grey sandstone, siltstone, shale

BUCKINGHORSE FORMATION (10-13)

13 Concretionary and rusty weathering shale

12 Greenish-grey sandstone

11 Concretionary and rusty weathering shale, pebble-conglomerate and grey sandstone

PERMIAN (?)

9 Thick grey chert, grey sandstone, mudstone on section only

PERMIAN AND CARBONIFEROUS

8 MATTSON FORMATION: sandstone, shale, limestone (may include map-unit 9); 8a, lower part; grey sandstone, coal; 8b, middle part; grey to brown sandstone; 8c, upper part; grey sandstone, fossiliferous sandstone, shale

MISSISSIPPIAN

7 Grey, fossiliferous limestone, grey shale, thin grey sandstone

MISSISSIPPIAN AND DEVONIAN

4 Dark grey shale; sandstone; 4a, may include equivalents of Nahanni Formation, and map-units 5 to 7

FIGURE XVI-10: Cross section of general geology across the Liard River.

Placer gold distribution

The study was done in June when water levels were high and subject to large daily fluctuations. This meant that many of the islands bars could not be sampled and point bars were sampled only on their leading edges. Sampling was done by panning randomly-selected areas on the available bars and counting the colours. The gold is so fine it is estimated that 30 - 35,000 colours were equivalent to one ounce.

The following paragraphs detail the distribution of placer gold found between Fort Simpson and British Columbia border.

Fort Simpson to Poplar River

The sand bars at the confluence of the Liard and Mackenzie rivers were sampled (Fig XV1-14). Of eight pans only one colour was recognized. At Scotty Creek (Fig XV-14) a small back-eddy provides quiet water in which to test this area. No colours were found. This sample is not representative of this stretch of the river as for 14 miles it is the only place in the rapids where one can safely dock a boat.

The rapids are a series of steps caused by more resistant limestone units of the Fort Simpson Formation. This series of natural riffles would be an ideal settling point for gold, but no samples could be taken because of the speed and turbulence of the water. No colours were found at the head of the rapids at Poplar River. Five samples were panned. (Fig XV1-14).

Birch River to Nahanni Butte

No samples were taken from the Longreach, because of high water levels. (Fig XV1-15) This is a straight stretch of the Liard from Birch River to the Blackstone where extensive mid-channel, skim or point bars are exposed at low water.

At Blackstone Landing (Fig XV1-15) F. Blanchut had recovered several match-head sized spherical nuggets from mid stream using a portable floating sluice box. Few colours were gleaned from mixed gravel and mud exposed on the river bank.

Opposite E Linberg's cabin (Fig XV1-15) an average of 18 colours per pan were won from coarse mixed gravels, sands and muds from a sediment bar on the north side of the river. At Swan Point (Fig XV1-15) 2 - 3 colours were found in fine sands and muds with scattered coarse gravels. No colours were found in gravels from the Blackstone, Rainger or Matou Rivers.

FIGURE XVI-12: Entering the Liard Rapids.

FIGURE XVI-13: The Gate, South Nahanni River.

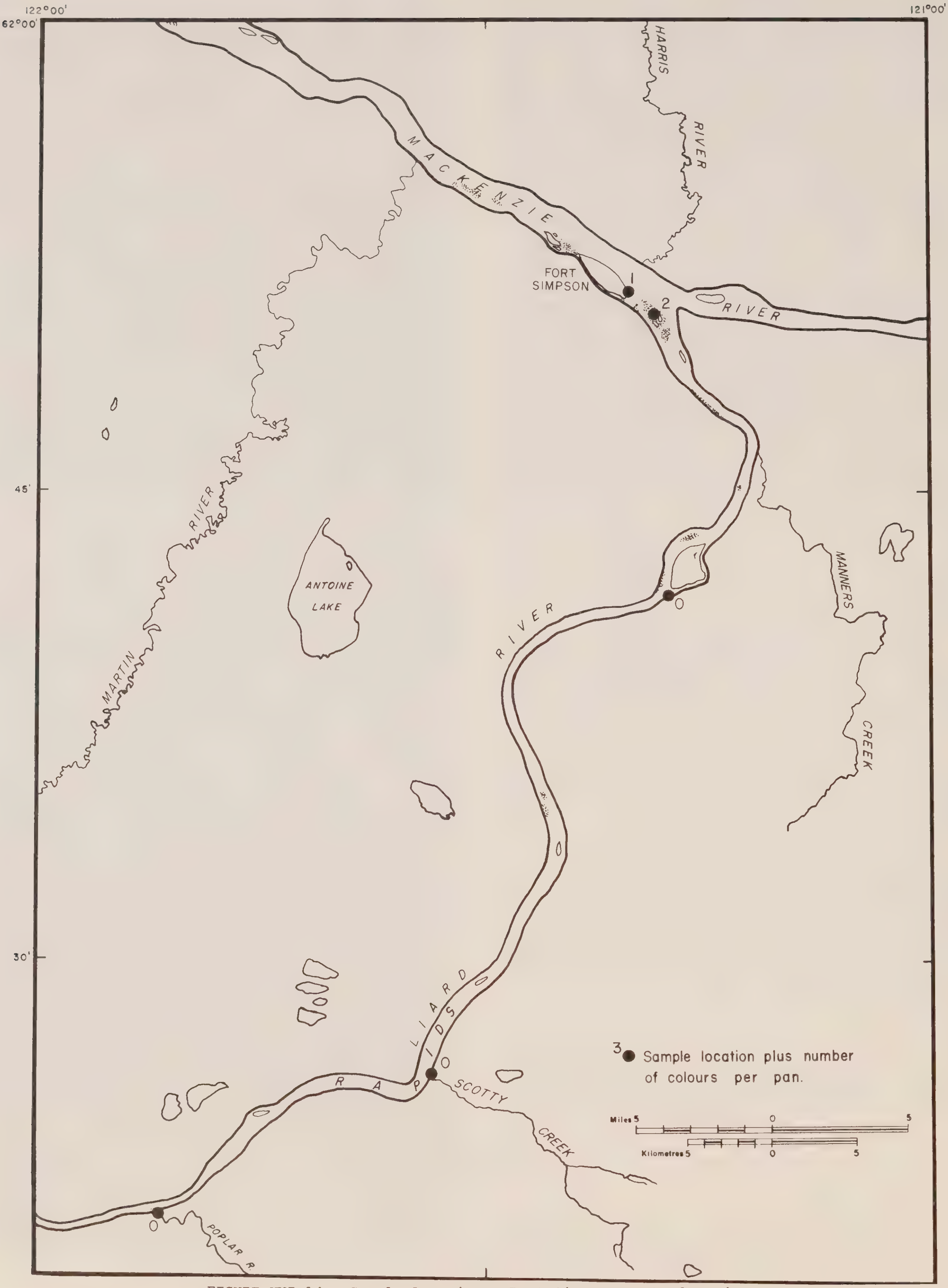


FIGURE XVI-14: Sample location - Fort Simpson to Poplar River.

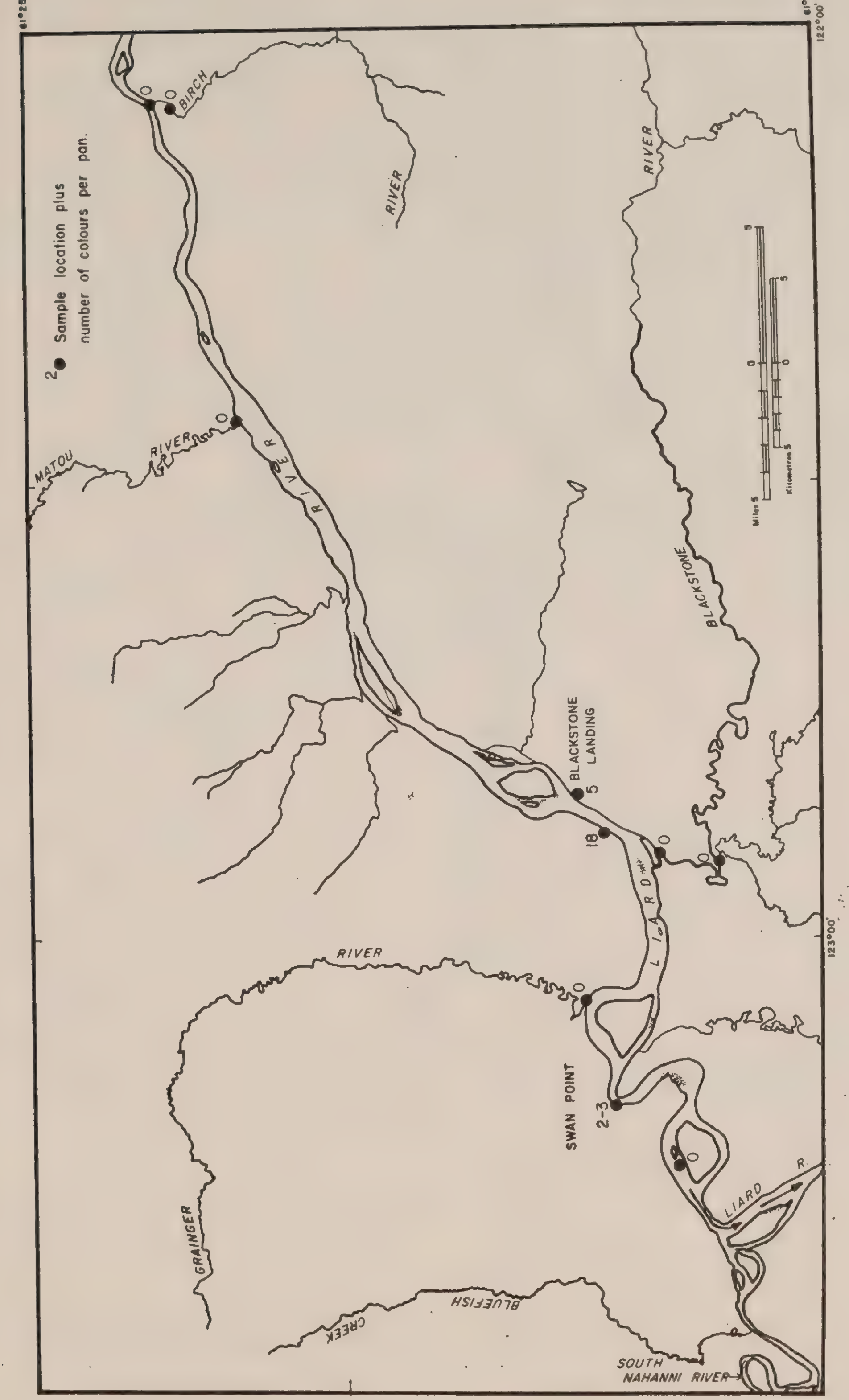


FIGURE XVI-15: Sample location - Birch River to Nahanni Butte.

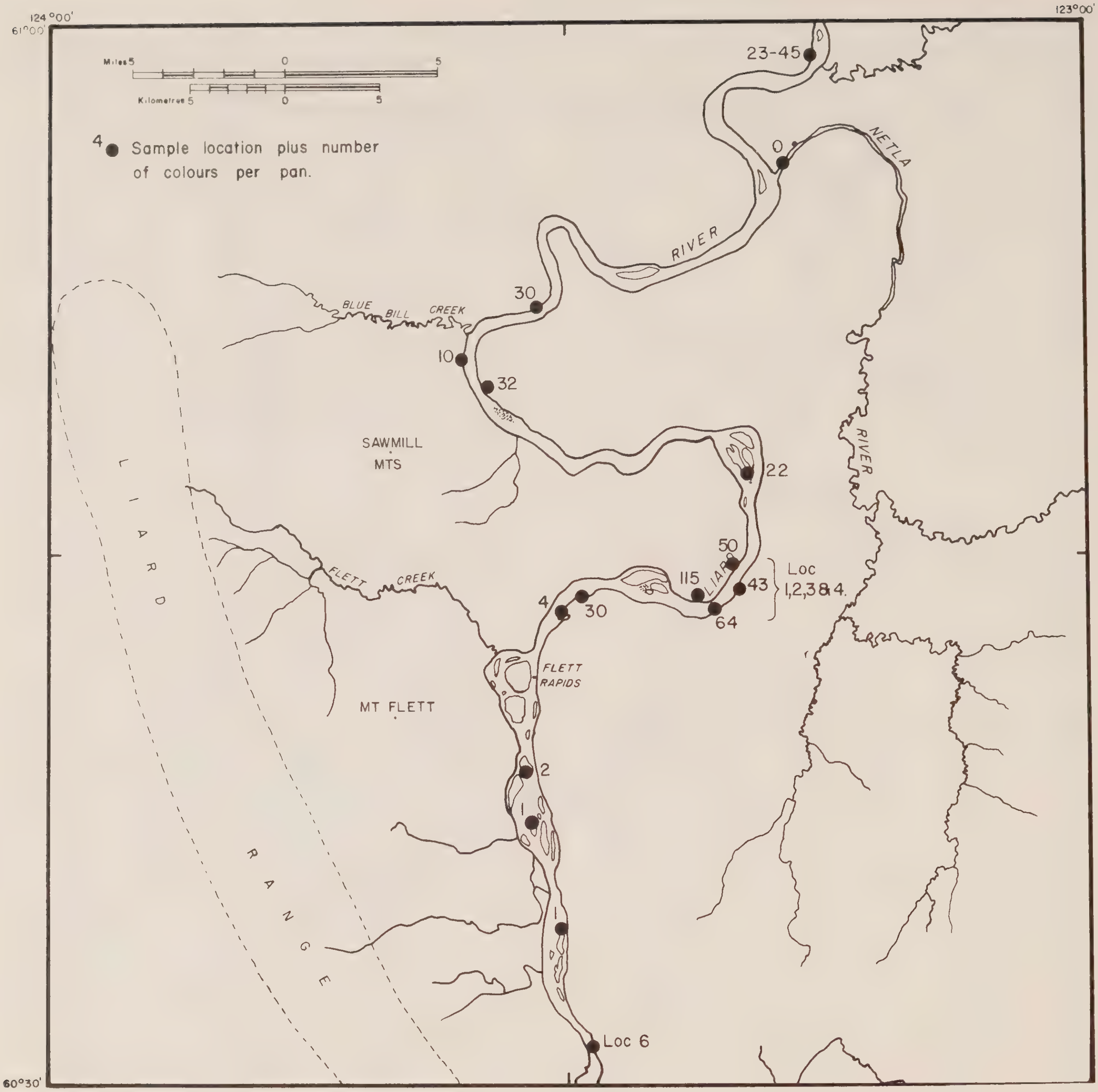


FIGURE XVI-16: Sample location - Nahanni Butte to above Big Island.

Nahanni Butte to above Big Island

From the British Columbia border the Liard flows north and at Nahanni Butte turns and flows easterly to Fort Simpson. (Fig XVl-16)

A large, well-sorted point bar about 8 miles south of Nahanni Butte was the site of Ole Linberg's placer operation mined in the 30's. Samples of gravel bank material contained 23 - 45 colours per pan. Two cubic yards of gravel were fed through a crudely constructed, 16-ft sluice box. One yard gave 8.5lb of concentrate that contained 2.8oz/Au/ton, the other 7.3lb of concentrate contained 2.3oz/Au/ton. An approximate price of $8 - 10 a yard.

A 3-ft section of the bar showed fine gravels, alternating with sands and clays. Eighty-five per cent of the gold was recovered from the sand and clay layers.

From Flett Rapids to the Netla River, the Liard develops large meanders. The leading edges of these point bars gave the highest colour counts. Locations, 1,2,3 and 4 averaged 60 colours to a pan with a high at location 5 of 115.

From location 6 to Flet Rapids, the Liard is straighter ,with numerous sediment and mid-channel bars. Most of the major bars were tested but gave only 1 - 2 colours.

The river has much faster flow rates in this section compared to the meander section where current strenght is approximately a third less.

No colours were found in gravels from Netla, Blue Bill or Flett Creeks.

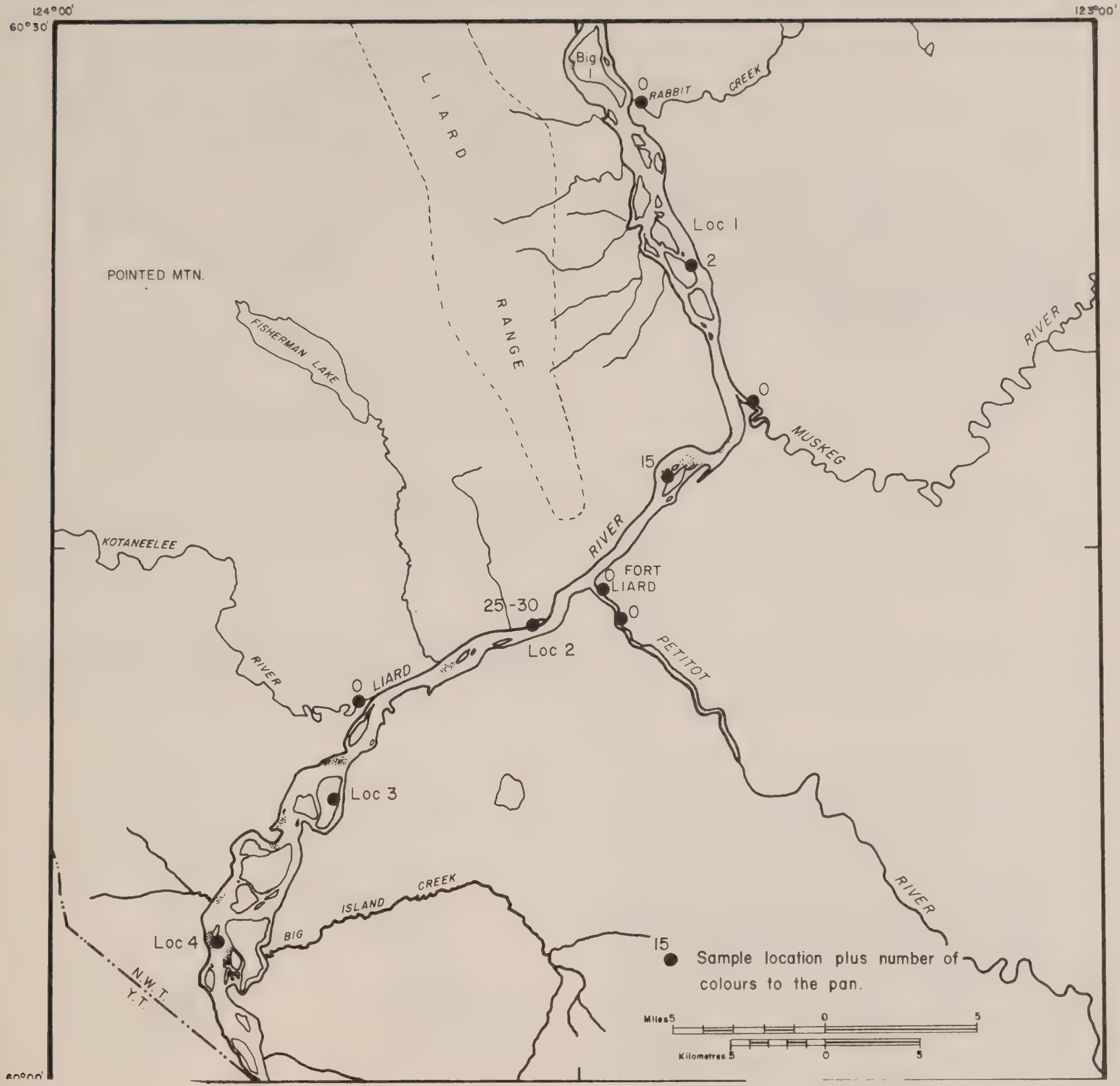


FIGURE XVI-17: Sample location - Big Island to British Columbia border.

Big Island to the British Columbia border

South from Big Island, the river has many sediment and channel bars. Few were tested as the river level was high. One skim bar was tested (location - 1) that gave 2 colours to the pan. South of Fort Liard a large point bar (location - 2) gave 25 - 30 colours to the pan. Locations 3 and 4 gave 2 - 3 colours to the pan.

No colours were obtained from gravels in the Petitot, Muskeg or Kotanelee rivers.

Discussion

The diagrams below illustrate the morpholigical features that that were tested.

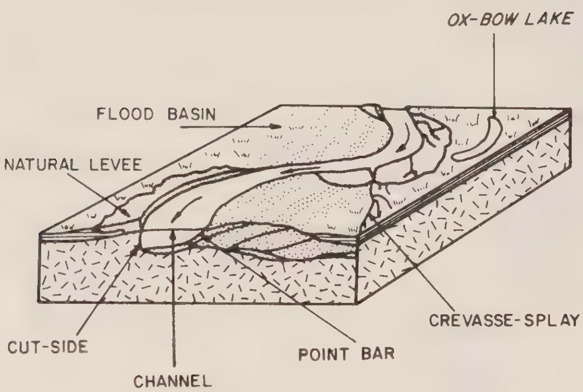


FIGURE XVI-18: Diagrammatic representation of various kinds of fluvial deposits. (After Sing 1972).

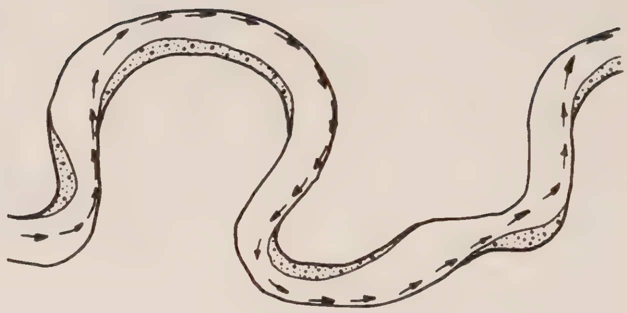


FIGURE XVI-20: Note flood gold would tend to accumulate on leading edges of point bars. Similar to the area between Flett Rapids and Netla River.

Figures XV1-19 and 20 illustrated that part of the Liard from Flett Rapids to the Nettla and of the Longreach.

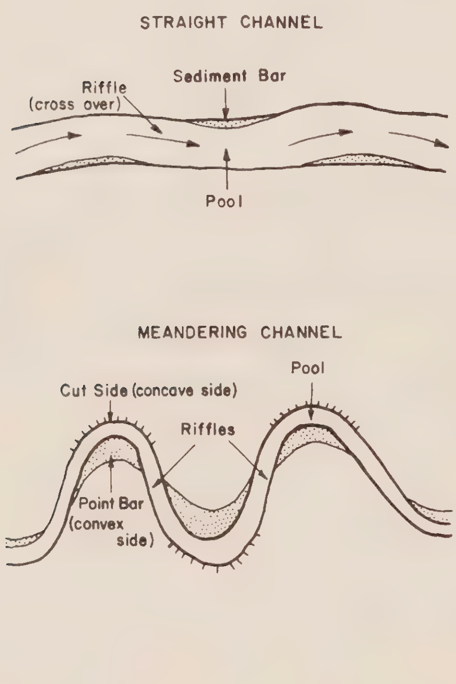


FIGURE XVI-19

Results to date indicate that the fine gold found is of two types ie River Deposits and Flood gold deposits. Figures 21 and 22 illustrate where gold is likely to be concentrated.

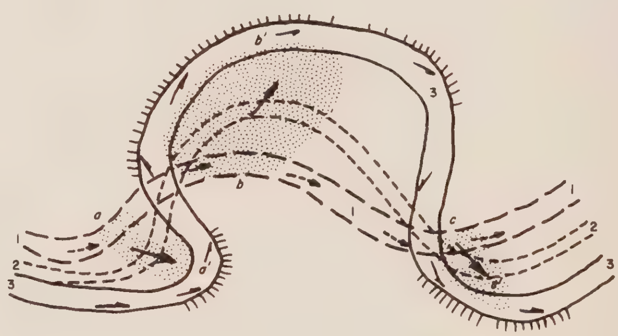


FIGURE XVI-21: Gravel deposition and formation of pay streaks in rapidly flowing meandering stream, in which meanders migrate laterally and downstream. Stream arrows represent point of cutting. 1, Original position; 2, intermediate position; and 3, present position of stream. Deposits formed at a,b,c' or inside of meanders of stream 1, become extended downstream and laterally in direction of heavy arrow growth to a',b'c' on present stream, and buried pay streaks result.

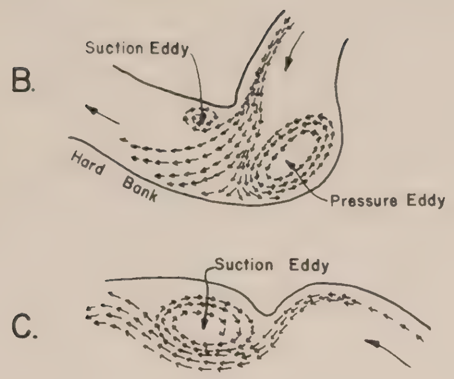


FIGURE XVI-22: B, Diagram to show positions of pressure and suction eddies in a river; gold is more likely to be deposited in the suction eddy than in the pressure eddy. C, Diagram to show how a suction eddy is formed in a river (after Thomas and Watt; see Ries and Watson, Engineering Geology).

These would be of the river deposit type which are contained in well- sorted gravels and point bars and although the overall grade may be low pay, streaks and bedrock concentrations rich enough to support large-scale mining ventures are not uncommon (Robinson 1980).

The flood gold type is usually found as minute gold particles concentrated on accretion or skim bars deposited during periods of high water.
These deposits may give rich pans but tend to be thin and relatively low-grade overall.

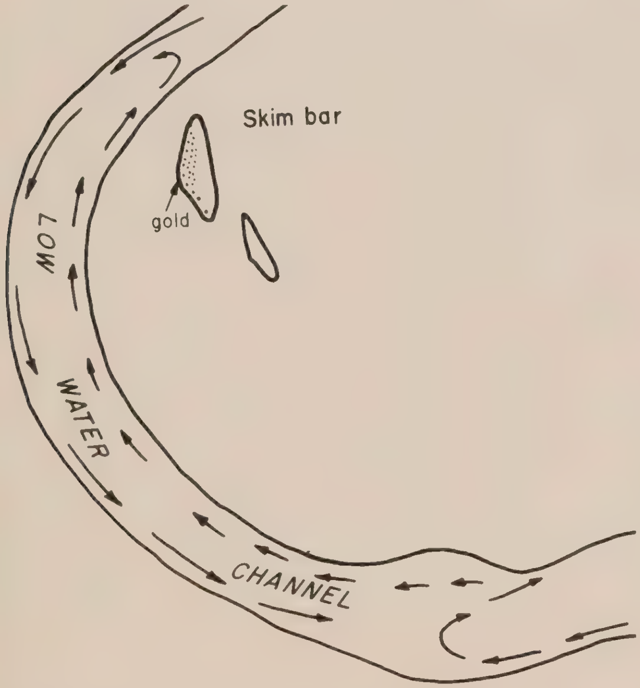


FIGURE XVI-23: Accumulation of fine gold on skim bar at flood stages of the river.

FIGURE XVI-24: Cross section at Skim Bar. Note how flood gold accumulates at high water mark.

Most of the bars tested in the Liard gave poor results. Some of the sampling was not representative because of the high water levels and hence the most productive part of the bars could not be tested.

The gold size did not increase upstream but remained almost a uniform size in all areas tested. Testing to date indicated that the gold was not derived from either the mountains to the west or the lowlands to the east. It is possible that it could be derived from the Francis Lake area Yukon Territory at the headwaters of the Liard, approximately 300 miles away, where economic placer deposits are known to exist. Studies later should confirm or deny this suggestion.

FIGURE XVI-25: Placer gold operation in the Livergood District Alaska Gravel and grade are similar to that found in the Liard area.

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Mineral Industry Report 1982 – 83 Northwest Territories

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RESUME

INTRODUCTION

Le present rapport traite de l'industrie d'exploration et d'exploitation minières des Territoires du Nord-Ouest (TNO) dans les années 1982 et 1983. Il a été rédigé a Yellowknife par le personnel de la Division de la Geologie du Programme des Affaires du Nord, ministère des Affaires Indiennes et du Nord Canada. M. John Brophy, géologue du bureau, a édité les contributions des auteurs de chaque chapitre.

ORGANIZATION DU RAPPORT

Le rapport comprend 8 chapitres. Le premier chapitre donne un sommaire de l'activité minière et décrit la fonction et les activités de la Division de la Geologie. Le deuxieme chapitre décrit la géologie et la production des mines en opération durant 1982 et 1983. Les 6 autres chapitres décrivent l'exploration minières dans chaqu'une des provinces et sous-provinces géologiques délimitées dans les TNO. Les provinces sont introduites, en guise du préface, par une brève description géologique et un aperçu de l'exploration dont elles ont fait l'objet. Les propriétés explorées dans chaque province ou sous-province sont généralement présentées selon le systeme national de cartographie.

Les descriptions des propriétés explorées sont composées de sept parties. Le TITRE comprend le nom de la compagnie a qui appartient la propriété, les métaux récherchés et l'emplacement de la propriété selon le systeme national de cartographie et les coordonnés de latitude et de longitude. La section REFERENCES comprend une liste des publications dans lesquelles sont décrit la géologie et les travaux effectués auparavant sur la propriété. En plus, on a ajouté cette année les numéros des rapports d'evaluation des mines dont on s'est servi pour décrire les travaux effectués et les résultats obtenus. Les deux sections suivantes indiquent les noms des PROPRIETES explorées et leur EMPLACEMENT. La cinquieme section décrit l'HISTOIRE de l'exploration sur la propriété et la sixieme comprend une DESCRIPTION de la geologie et des gisements de minerai découverts auparavant. La dernière partie est une description des TRAVAUX EFFECTUES en 1983 et 1983 et des résultats de ces travaux. Puisque l'information inclue dans cette partie est abstraite des rapports d'évaluation des mines, la permission des compagnies a qui appartiennent les propriétés a ete obtenue avant la publication de ce rapport.

APERCU GENERALE DE L'EXPLORATION

Près de 50% moins de projets d'exploration ont été entrepris dans les TNO en 1982 (113) et 1983 (115) qu'en 1981 (218). La superficie jalonnes a décrut de 80% en 1982 mais a augmenté de 115% en 1983. Par contre, le nombre de permis de prospection émis en 1982 (91) et en 1983 (96) étaient plus qu'en 1981 (73)

L'or est devenu le métal le plus recherché, déplacant l'uranium. Ceci se traduit par une augmentation du nombre de travaux entrepris dans la province des Esclaves en 1983 et une diminution des travaux dans la province de Churchill. Le nombre de projets entrepris dans les autres regions des TNO demeure fixe a 50% du nombre entrepris en 1981.

APERCU GENERAL DE LA PRODUCTION MINIERE

Deux nouvelles mines, le dépot aurifere de Lupin (Echo Bay Mines Ltd.) et le dépot d'argent de Smallwood (Terra Mines Ltd.), ont été ouvertes en 1982. Les douze mines des TNO ont produit $595 million de métaux et ont employé 2700 personnes en 1982. La valeur de métaux produits en 1983, $514 million, marque une diminution de 14% causée par la fermeture de la mine Eldorado, la cessation d'opérations à la mine Pine Point pour cinq mois et à la mine Cantung pour 11 mois. Le dépot aurifère de Salmita a été ouvert par Giant Yellowknife Mines Ltd. en 1983.

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CHAPTER 1: INTRODUCTION

W.A. Padgham, Chief Geologist
Northern Affairs Program, Yellowknife, NWT

This report describes mining and mineral exploration conducted in the Northwest Territories (NWT) in 1982 and 1983. It was prepared by the staff of the Geology Division of the Northern Affairs Program, Department of Indian and Northern Affairs (DIAND), Yellowknife, NWT. It is one of a series of reports that have been produced annually or bi-annually since responsibility for monitoring and reporting on mining and mineral exploration were assumed by DIAND in 1969.

SUMMARY OF MINING AND MINERAL EXPLORATION

The NWT mining industry fared remarkably well during the general mining recession that began in 1981. The decline in the price of silver caused considerable problems for silver producers in the Great Bear Lake silver districts, and brought to an end attempts to bring the Prairie Creek silver-base metal vein deposits of Cadillac Mines Ltd to production. The sharp decline in tungsten prices together with severe restrictions in demand for this metal forced Canada Tungsten Mining Ltd to cease production at its Cantung mine for most of 1983. Similar though less precipitous declines in the price and demand for lead and zinc forced Pine Point Mines Ltd to close the Pine Point Mine for 6 months in 1983. Conditions, price and market demand improved during late 1983 and production recommenced in June at Pine Point mines after only a half-year interruption and at Cantung in December.

These negative effects on the NWT's mineral economy were offset considerably by production from three new gold mines, (B-Zone, Salmita and Lupin) and by production from the rich lead-zinc deposit at Polaris, the world's most northerly metal mine. The fact that the Polaris and Nanisivik mines are on tide water permits their zinc-rich ores to remain competitive in world markets during periods of low demand.

Production from the new gold mines became firmly established during the period and a strong gold price contributed to maintaining healthy production from the much older Yellowknife-area mines.

Exploration expenditures in 1982 and 1983 ranged between 25 and 30 million dollars each year. Figures vary between reporting agencies because some report exploration expenditures in and around mines and others do not. Also, not all explorers make their expenditures known.

Mineral exploration, which declined precipitously in 1981 to about 60% of the 1979-1980 boom levels when nearly 50 million dollars was expended, was undergoing a major re-deployment of effort.

Uranium was the major target from about 1977 to 1981, having replaced to a large extent base metal exploration, which had been the number one target through most of the previous 15 years. Gold replaced uranium as the major target commodity in late 1980. Because exploration for gold was carried out mainly by junior companies that had difficulty in raising funds during a period (1980-1982) of high inflation, high interest rates and general economic difficulties, and because many uranium exploration programs were conducted by large, well-financed organizations, the change from uranium exploration to gold exploration was gradual. Many costly drill programs to test uranium prospects discovered during the boom continued during the review period and cushioned the exploration sector from much of the decline underway in adjoining parts of Canada.

Though uranium exploration expenditures continued to decline through 1983, base metal exploration expenditures had stabilized at a healthy level, mainly because of the search for additional ore reserves around the operating mines. Expenditures for gold exploration were up significantly. Interest in the coal resources of the high Arctic and, to a lesser extent, in the Interior Platform and Cordillera contributed significantly to exploration expenditures during the review period.

At the end of 1983 mineral exploration in the NWT appeared to have entered a time of more balanced exploration effort with continued expenditures on uranium, base-metals, silver, tungsten and coal and a gradual increase in expenditures on gold. There are signs that a number of gold deposits of economic grade and tonnage can be expected to see development over the next five years.

Oil and gas exploration, which is monitored by COGLA (Canadian Oil and Gas Lands Administration) and not by the Geology Division, were important components of the mineral industry. Production was stable at Norman Wells, but expenditures on pipeline and field development became extensive during the review period. When this billion dollar development is completed, NWT oil production should expand to 10 times its present level. Gas production from the Pointed Mountain field declined, but might be replaced in the near future if nearby fields that are now under development are exploitable.

Oil and gas exploration, a major contributor to the northern economy, was confined mainly to younger fold belts of the NWT (Innuitian and Cordilleran) and to the Beaufort Sea/Mackenzie Delta, part of the continental shelf. Restructuring of the oil and gas land leasing system took place during the first few years of the 1980's under the Petroleum Incentives Program.

Four geologists monitored non-hydrocarbon mineral exploration and mining during the review period.

P.J. Laporte monitored the District of Keewatin, which covers a large part of the Churchill Structural Province including areas of reworked Archean granite-greenstone terrain and extensive late volcanics and post-tectonic continental sandstones and conglomerates. Exploration for unconformity related uranium deposits focused on areas believed to be close to the unconformity between the basement and the continental sediments. Gold and minor base metal work concentrated on the reworked Archean and adjacent younger metamorphosed supracrustals.

J.B. Seaton monitored activity in the Archean Slave and adjacent Proterozoic Bear Structural Provinces. Targets included silver and uranium in the Bear and mainly gold, but also volcanogenic silver-base metal and rare metal pegmatites, in the Slave.

C. Lord monitored the NWT portion of the Cordillera and adjacent parts of the Interior Platform as far east as $128^{O}W$ longitude. Targets in this area include tungsten and shale-hosted lead-zinc along the Selwyn Basin-Mackenzie Arch hinge zone and gold disseminated in and around intrusives in the hinge zone and in the streams of the Liard-Nahanni drainage basin. Silver, coal and barite are also potential targets, though little was done on these in the period under review.

The remainder of the territory was monitored by W.A. Gibbins. His district includes 1) the Pine Point mining district and adjacent parts of the Great Slave lowlands where targets are lead and zinc, 2) the East Arm of Great Slave lake (Athapuscaw Aulacogen) and related Proterozoic intrusives along the south edge of the Slave Province, where targets include uranium, silver, copper and, in the intrusives, rare metals, 3) the Churchill Province west of the Keewatin where the main target is uranium, and 4) the Arctic Islands where lead-zinc, coal, uranium, iron and rare element pegmatites have been found.

Mineral exploration expenditures and the number of properties examined in 1983 are about the same as they were in 1982, but the number of exploration groups involved probably increased. This reflects a shift from base metal and uranium exploration, which has been dominated by large companies, to gold exploration, which attracts a higher proportion of prospectors, smaller exploration groups and junior mining companies. In 1983, there were more gold exploration projects (53) than base-metal projects (19) and uranium projects (25) combined. Table 1 shows where exploration took place within the various NWT Districts. Nearly 45% of all exploration projects were for gold.

TABLE 1-1: COMPARISON OF ACTIVITY IN VARIOUS AREAS

GEO-REGION	NUMBER OF PROPERTIES EXPLORED								
	1975	1976	1977	1978	1979	1980	1981	1982	1983
Cordillera	25	28	13	14	21	29	24	12	11
Arctic Islands Baffin and Melville	8	9	6	8	4	7	24	16	11
Keewatin (Churchill Prov.)	31	37	38	36	48	53	59	34	25
SE Mackenzie (Churchill Prov. Nonacho & Thelon Areas)	3	7	11	7	13	14	25	10	11
East Arm	10	7	2	7	6	4	14	3	1
Pine Point	3	4	3	7	5	6	6	3	2
Bear Prov.	18	27	35	32	32	22	24	10	11
Slave Prov.	44	44	28	29	33	29	42	25	44
TOTALS (NWT)	142	163	136	140	162	164	218	113	116

Table 2 relates projects and commodities to the main area and predominant age of rocks containing the target commodities.

Because of large expenditures in the Pine Point District and around Nanisivik, a considerable amount (probably at least $6 million each year) was expended on base-metal exploration. More than half of this was spent in the Pine Point District. Expenditures on

uranium exploration continued to decline and were probably down to $4 million in 1983.

TABLE 1-2: NORTHWEST TERRITORIES 1982/83 EXPLORATION BY COMMODITY

COMMODITY	AGE OF MAIN HOST ROCKS (GEOLOGICAL PROVINCE)	NO. OF PROJECTS
GOLD	ARCHEAN (SLAVE)	(25) 53
URANIUM	PROTEROZOIC (BEAR/CHURCHILL)	(36) 25
SILVER	PROTEROZOIC	(3) 9
BASE METALS	ALL AGES	(30) 19
RARE METALS	ARCHEAN/PALEOZOIC	(15) 7
COAL	CRETACEOUS TERTIARY	(2) 1
IRON	PROTEROZOIC	(2) 1
	TOTAL	(113) 115

In 1983, several rare-metal exploration projects were conducted, including: 3 tungsten drilling projects; one tungsten mine under development in the Cordillera; one rare-metal exploration project in the Slave Province; and two rare-metal projects in the Blatchford Lake complex on the edge of the East Arm Subprovince. With coal, iron and silver exploration this work represents another $2 million in expenditures.

Expenditures on gold exploration and gold property (mine) development, approximately $12 million, aggregated about one half the total expenditure (20 to 25 million) on mineral exploration in the NWT during 1983, up slightly from 1982 levels.

Land acquisition (Table 4) was mainly in areas with gold potential, and barring a significant decline in the price of gold, exploration in areas of gold potential will increase dramatically in the next few years. Targets will be mainly in the Slave Province, but also in the Cullaton Lake area of the Ennadai-Rankin (Kaminak) Volcanic Belt and around Cretaceous intrusions in the Cordillera, where significant gold assays have been recorded in base metal and tungsten-bearing skarns. Placers in the Liard Valley are also targets of some potential.

Table 1 shows the shift of exploration from area to area as different commodities; base metals, uranium and gold; became major targets. Pine Point, Arctic Islands and the Cordillera are primarily base metal areas; Bear and Churchill provinces primarily uranium. The Slave Province hosts as yet uneconomic volcanogenic base metal and silver-base metal deposits and numerous gold deposits, as does the Kaminak Volcanic Belt in the Keewatin.

Table 3 shows higher-cost projects that include drilling (54 projects in 1983, a 20% increase over 1982) and mining development (8, a 60% increase over 1982). Most of the increase is in small-scale gold operations that will not add greatly to value of production.

TABLE 1-3: HIGH COST PROJECTS

	1975	1976	1977	1978	1979	1980	1981	1982	1983
Drilling Projects	47	41	40	52	61	81	58	45	54
Mines in Development	5	3	2	2	4	6	12	5	8
Mines in Production	6	6	7	7	8	9	11	12	12
TOTAL	58	50	49	61	73	96	81	62	74

MINING LAND ACQUISITION

The NAP Mining Lands Division administers most aspects of mineral rights tenure in NWT. Claim maps, mineral property maps and Territorial Resource Base Maps are available on the fourth floor of the Bellanca Building.

The NWT is divided into three Mining Districts, Arctic and Hudson Bay, Mackenzie and the much smaller Nahanni District. Staking records and statistics are kept by the mining recorders of the Mining Lands Division relating only to these areas. For this report these have been reassembled (Table 4) to show activity level by geological areas.

Mineral claim staking was down significantly in 1982 compared to previous years (Table 4B). By year end just under 160 thousand hectares of claims had been recorded compared to an average of 751 thousand during the previous 7 years. Claim staking in 1983 covered about twice the area as that staked in 1982.

Though more (91) Prospecting Permits were issued (Table 4A) 53 of these were for lands over which coal exploration leases had been granted last year to Petro Canada. Mineral exploration on these lands was undoubtably being carried on the back of the coal exploration. The 38 remaining permits are only 50% or less of the number of permits issued in the last 4 years.

TABLE 1-4A: PROSPECTING PERMITS ISSUED, 1976 TO 1983 IN VARIOUS GEOLOGICAL PROVINCES

	1976	1977	1978	1979	1980	1981	1982	1983
Arctic Islands	0	0	10	0	10	2	53	87
Cordilleran Province	1	0	5	1	11	9	12	7
Churchill Province	53	25	50	72	57	54	17	1
Bear Province	13	8	10	26	17	4	3	0
Slave Province	1	1	0	0	3	4	6	1
TOTALS	68	34	75	99	98	73	91	96

TABLE 1-4B: GROUND STAKED DURING THE YEARS 1976 TO 1983 IN VARIOUS GEOLOGICAL PROVINCES IN THOUSANDS OF HECTARES

	1976	1977	1978	1979	1980	1981	1982	1983
Arctic Islands	0.9	1.4	82.1	16.0	9.7	3.0	22.8	4.0
Keewatin Region (Churchill Province)	214.0	108.0	620.0	438.8	518.1	323.2	65.0	52.6
Churchill Province (West of Keewatin)	30.4	78.7	314.0	322.1	175.5	82.5	18.4	31.3
Slave Province	62.2	67.8	53.9	35.6	51.0	153.3	20.7	218.5
East Arm Subprovince	1.5	2.1	2.6	11.1	.02	11.2	.1	Nil
Bear Province	45.0	170.0	84.6	171.8	40.0	21.0	6.7	13.3
Pine Point District (Interior Plains)	49.2	5.6	255.3	131.9	13.5	2.5	0.7	.1
Cordilleran Province	8.2	19.9	19.0	14.4	25.2	12.9	25.0	11.6
TOTALS	411.4	453.5	1,431.5	1,141.7	832.9	609.6	159.4	331.4

Ninety-six Prospecting Permits were issued in 1983 (Table 4A). Of these, fifty-five were taken out in NTS 39 and 48 on the southeastern side of Ellesmere Island and in the Milne Inlet area of northern Baffin Island by 103912 Canada Inc. of Calgary. The Ellesmere Island Prospecting Permits cover mainly Precambrian Churchill Province rocks. The Baffin Prospecting Permits lie south and east of Nanisivik mine and cover Helikian platform formations in the Borden Trough and adjacent Churchill Province metamorphic-igneous rocks.

Trigg Woollett and Associates took a permit covering rocks at the contact of the Slave Province and the Goulburn Group south of Bathurst Inlet and Suncor took a permit (65 G/1 NE) immediately north of the Cullaton Lake gold mine.

Borealis Exploration took 8 permits in NTS 47A covering areas containing most of the Proterozoic iron formations in the western part of the Foxe Fold Belt (Churchill Province). Panarctic Oils Ltd obtained 24 permits covering Bear Province basaltic rocks in the Minto Arch of central Victoria Island. In the Cordillera, Hudson's Bay Mining and Smelting took 4 permits along the Liard River and Esso Resources took 4 permits in the Flat River area (95 E/2) covering Cretaceous intrusions cutting Ordivician to Silurian limestones.

The absence of new prospecting permit applications for the areas of uranium potential in the Baker-Thelon and Hornby basin underscores the shift of exploration to other commodities.

In 1982, forty-four Prospecting Permits lapsed or were relinquished and in 1983, sixty-nine more were given up. More than 70% of these were in areas where the target commodity was uranium.

Claim staking in 1983 increased significantly over 1982, from 160,000 Ha to 330,000 Ha (Table 4B). Most of this increase resulted from staking for gold in the Slave Province. There were increases in staking in the southeast Mackenzie (Churchill Province) and in the Bear Province also, but elsewhere staking declined.

In 1983 about 5,400 claims lapsed, reducing the claimed area by 700,000 Ha. Most of these were small, 500-m-square claims. New staking, mostly as large blocks, added approximately 330,000 Ha to the total for NWT, which on January 1, 1984, stood at 40,952 claims in good standing covering 3,114,606 hectares.

Currently available details on over 100 exploration projects are described in the following sections by the Geology Division's District Geologists, who also monitor producing and developing mines in their respective Districts, a function they share with the Staff Geologist who prepared the Chapter of this report recounting the production and developments at the 12 mines that produced during 1982 and 1983.

NORTHWEST TERRITORIES GEOLOGY DIVISION ACTIVITIES

The Northern Affairs Program of the Department of Indian and Northern Affairs administers the quasi-provincial responsibilities for resources, land, economic development, and environment in the Northwest Territories (NWT) that have been retained by the Federal Government. The NWT Geology Division, stationed in Yellowknife, administers the provincial level responsibilities for geology and for the mining and mineral exploration industries within the Territory.

The Geology Division also conducts numerous projects to investigate the mineral potential and geological framework of the NWT. Projects conducted by Geology Division staff average 10 to 15 a year. These may be under the direction of any of the geologists on staff. In the past few years most were conducted by geology graduate students employed only during the summer months.

A project geologist position was filled in 1983. The incumbent will in future years conduct mapping projects and assist monitoring those conducted by summer staff.

The Geology Division let 8 contracts to university geologists for geological investigations

in 1982 and 15 in 1983 (Tables 5A and 5B). Products include maps and reports which are normally released as Economic Geology Series open files. Preliminary reports are published in the Geology Division's yearly Overview of Mining Exploration and Geology. Final reports are published in the recently initiated series "Contributions to the Geology of the Northwest Territories", are presented in theses at various universities or are published in journals and symposia volumes.

Table 5 lists the contracts issued in 1982 and 1983, the principal workers and the products expected or received.

During 1982, Geology Division survey crews continued mapping parts of the Yellowknife Volcanic Belt, producing 3 detailed (1:10,000 scale) maps covering the eastern part of Yellowknife Bay where most of the Duck Lake Volcanics are exposed. This crew then moved north and mapped 76 M/10 and M/15 on the Arctic Coast. Mapping was also begun farther west (76 M/11) on the Anialik River granite gneiss, which hosts extensive low-grade auriferous quartz veins.

C. Lord continued studies of placer gold deposits in the Liard River drainage system and W. Gibbins assisted Inuit carvers in soapstone evaluation. A new source of stone found in the Mary River area of Baffin Island (37 G/5) is now widely used in nearby communities. The good stone from this source has resulted in a multifold increase in the value of carvings produced in Pond Inlet (Gibbins, Personal Communication, 1984).

During 1983, the 30 field studies financially supported by the Geology Division were spread from the high Arctic (Baffin and Prince of Wales Island) to Norman Wells and Fort Smith. Expediting service was provided out of Yellowknife for 10 Geological Survey of Canada field crews and 24 university-sponsored projects supported by the Geology Division.

In the Keewatin, P.J. Laporte (District Geologist) continued mapping in the Judge Sissons-Schultz Lake area where Urangesellschaft has a large unconformity-related uranium deposit (Lone Gull) projected for production sometime in the next decade. Laporte also collected water samples around operating drill rigs as part of a study designed to provide base-line data on health hazards unique to uranium exploration. Professor J.A. Donaldson of Carleton University continued a study of regoliths along unconformities that have been targets of uranium exploration.

In the Arctic Islands, W.A. Gibbins (District Geologist) examined ultramafic rocks near the coast of Prince of Wales Island for carving stone. This is part of a long-term project to find carvable stone for the Inuit carving industry, which has a gross market value of 10 to 12 million dollars a year. With Dr. Hogarth (University of Ottawa), Gibbins began geological mapping of "Frobisher's Mine" in Frobisher Bay. A University of Alberta student (F.W. Nentwich) conducted field research on the Cape Crauford Formation of Northern Brodeur Peninsula (Baffin Island). The results of this will be a Ph.D. thesis and new insights into the Paleozoic of the eastern part of the Arctic Platform.

In the Cordillera, I. Muir of the University of Ottawa studied a Middle-Devonan sequence comprising the Hume, Hare Indian, Ramparts and Canol Formations that form shale platform/basin margin/basin sequences.

Two university projects and a joint Geological Survey-NAP mapping project were completed in part of the Churchill Structural Province northeast of Fort Smith. L. Patterson (University of Alberta) mapped high-grade metamorphic rocks in the Tsu Lake area. Geochemical and isotope studies to assist in interpreting the genesis and age of these rocks are underway. L. Aspler (Carleton University) completed a project designed to unravel the stratigraphy and structure of the Nonacho Group supracrustals within the mid-Proterozoic (Paleo-Helikian) Nonacho Basin. New 1:50,000 scale maps of the basin will be available in 1984 and a Ph.D. thesis on these strata is nearing completion. N. Culshaw (GSC) led a NAP Geology Division Mapping crew in the Rutledge Lake Area where Ni-Cu sulphide showings were discovered in 1982. A preliminary map showing the relationships of the granulite/upper amphibolite facies rocks of this complex area will be available in the near future.

Nearly half of all the projects supported by the Geology Division were done in the Archean Slave Structural Province, where approximately one half of all company-sponsored mineral exploration projects took place.

R. Meintzer (University of Manitoba) completed the field work component of an evaluation of the petrology, geochemistry and genesis of the rare-metal-bearing pegmatite dykes and related granites in the Yellowknife Supracrustal Basin.

Nine field projects are underway in or adjacent

1982 TOTAL DIRECT COST $50,700.00

PROJECT NAME	PRINCIPAL WORKER	UNIVERSITY	GEO-PROVINCE	PRODUCTS
Surficial Geology Glacial Lake Coppermine	D. St-Onge	Ottawa	Bear/Slave NTS 86	1:250 k Regional Map of Coppermine River Valley detailed studies, reports and thesis.
Mineralogical studies Big Spruce Lake Alkaline Complex	D. Smith	Alberta	Bear/Slave NTS 85 0/12	Detailed map of the complex, various papers on the geology, petrology, minerology and geo-chronology of this rare-earth bearing complex. Also Ph.D. Thesis.
Geological Mapping Clan Lake Volcanic Complex	W.K. Fyson	Ottawa	Slave NTS 85 J/16	Detailed 1:1 k maps of the Clan Lake Volcanic complex reports and MSc thesis. Also article for Yellowknife Guide Book.
Detailed Geological Mapping Point Lake (Keskarrah Bay area)	T. Rivers	Memorial	Slave NTS part of 86/H	Detailed map, studies of structure metamorphic petrology and geological evolution.
Geological Studies Yellowknife Volcanic Belt	H. Helmstaedt	Queen's	Slave NTS 85 J,8, 9, 16	Detailed mapping and re-mapping parts of Yellowknife Volcanic Belt maps of areas of belt not mapped in detail. New 1:10 k maps. New 1:50 k maps Yellowknife Bay, Prosperous Lake and Quyta Lake.
Geological mapping Dumas Lake area and Geo-chronological studies	R. VanSchmus	Kansas	Bear NTS 86/K	Geological Map and Geo-chronology of Bear Province.
Sedimentological and paleoecologic study Kee Scarp Formation. Examination of Canol Imperial and Hare Indian Formations.	O. Dixon	Ottawa	Cordillera	Reports, sections and Ph.D. thesis.

to the Yellowknife Volcanic Belt, host to the Con and Giant Gold mines. H. Helmstaedt (Queen's University) is re-evaluating existing geological maps of the belt and preparing a new unified set of detailed maps (1:15,000 scale) and as well a new set of 1:50,000 scale maps of Yellowknife Bay, Prosperous Lake and Quyta Lake areas (NTS 85 J/8,9 and 16). W.K. Fyson (University of Ottawa) continued a long-term project to unravel the complex structural history of the Slave Structural Province, particulrly the supra-crustal component, of the Yellowknife Supergroup. G. Bailey (Queen's University) began a study of the Jackson Lake Formation, probably the youngest sedimentary unit in the Yellowknife Volcanic Belt. J.A. Brophy (NAP, Geology) continued detailed mapping of a small area of complex volcanic rocks that represent a lower part of the Kam Formation. W.A. Padgham reassessed exposures believed to represent the topmost part of that formation (the Giant Section) just east of the Giant Mine Plant. He also explored parts of the West Mirage Islands previously identified as representatives of the basaltic Kam Formation, but now considered part of the overlying Banting Formation, which is considerably more felsic. A.M. Goodwin (University of Toronto) began a geochemical study of Slave Province volcanic rocks by studying and sampling the Kam Formation of the Yellowknife Volcanic Belt.

G. Yeo (NAP, Project Geologist) headed a large field crew that completed reconnaissance in the Quyta Lake area, which contains the northern end of the Yellowknife Volcanic Belt and more felsic outliers such as the Clan Lake volcanic pile, whose relationship to the Yellowknife Belt is of considerable interest. Yeo also mapped part of the Reid-Hidden Lake area, proposed site of a territorial wilderness park or preserve and locale of numerous gold and rare metal properties.

Farther from Yellowknife in the Slave Province, R. St. J. Lambert (University of Alberta) sampled volcanic belts in the southeastern part of the province to further an assessment of the geochemical evolution of Archean crust.

G. Yeo (NAP, Geology), assisted by a crew of 6 graduate and 4 undergraduate students, mapped most of the West half of the Hepburn Island Area (NTS 76 M).

STATUS

Part of long term project to investigate glacial and post-glacial sediments on Northern Slave and Bear Provinces.

Field work completed. Lab work well in hand, various reports and papers issued. Ph.D. 1986.

Field work completed. Preliminary maps and papers published. MSc thesis fall 1984.

Maps and reports published. MSc expected fall 1984.

Work continuing most areas of belt now mapped in detail and preliminary maps published. New detailed compilation maps are being prepared. First releases expected early 1985. Numerous auxillary studies have developed from this overall project begun by Department staff in 1975.

Maps and reports have been produced.

Preliminary reports published.

Preliminary maps for 76 M/3, 4, 5, 6 and 12 will be released early in 1984. In the same general area W.A. Padgham, V. Jackson and B. Fischer completed a reconnaissance of the Anialik River granite gneiss, host to the Arcadia gold-bearing quartz veins. G. Yeo, J. Crux and C. Relf mapped the Canoe Lake Volcanics (76 M/3) in detail. This will be the basis of a B.Sc. thesis for Relf at Queen's University. Additional field work is planned in the Anialik River granite gneiss and adjacent parts of the Hepburn Island area in 1984.

Geological work in six areas of the Bear Structural Province was assisted. J. Patterson (GSC and Virginia Polytech) was assisted in studies in the East Arm of Great Slave Lake and in the western part of the Goulburn Group of the Kilohigok Basin. K. Pelletier (Ottawa University) began mapping the Ellington Lake area (86 F/3), concentrating on the supracrustal succession. Farther north, S. Bowring (University of Kansas) continued studies in the Adam, Benoit, Dumas, Kamut Lakes area along the Wopmay suture. He collected copious volumes of material for zircon dating, part of a joint project to date the development of the Wopmay Orogen. K. Munro (Carleton University) worked from Bowring's camp to map volcanics in the Dumas Group. Professor D. St-Onge (Terrain Sciences, GSC and University of Ottawa) studied the surficial geology of Glacial Lake Coppermine and, with A. Mercier (University of Ottawa) the glacial deposits of the Richardson River Valley. A crew of American researchers, including Neil Irvine of the United States Geological Survey and American university personel, were assisted in a study of the Muskox Intrusion.

Professor D. Smith (University of Alberta) began a study of the mineralogy and chemistry of the Thor Lake Property rare metal-bearing deposits in the Aphebian Blatchford Lake alkaline intrusive complex that lies just north of Hearne Channel on Great Slave Lake. The parameters of this study have not yet been defined.

A bald eagle research project led by Professor R. McLelland of the University of Montana was assisted for the third and final year. This project tracks eagles from their fall fishing grounds on the Snake River, to their wintering areas in various parts of the western United States and to their nesting sites. Geology became involved when aircraft were found necessary to track the eagle's tail-borne radio transmitters because they had flown into the roadless northern areas beyond the range of automobile-borne tracking devices.

A program was launched in September 1983 to obtain drill cores representative of typical ore bodies from each of the operating mines in NWT. These cores will be filed in the core library to provide a permanent, publicly available record of NWT orebodies. Response from operating mines has been excellent and, when completed, we should have a collection of considerable scientific value. It is also planned to obtain cores representative of ore bodies that supported mining in the past. Cores have also been collected from a number of properties that have recently been drilled, and a number of properties drilled years ago were visited to see if any drill core was salvageable. Success in the latter case has been minimal, but this will be pursued in future years.

Report Organization

The organization of this Mineral Industry Report is similar to that of previous ones, except that: 1)

1983 TOTAL DIRECT COST $93,800.00

PROJECT NAME	PRINCIPAL WORKER	UNIVERSITY	GEO-PROVINCE	PRODUCTS
Structure of Slave Province	W.K. Fyson	Ottawa	Slave	Studies and papers contributing to understanding of Slave Structure.
Structure and Evolution of Southern Slave Province.	R. St. J. Lambert	Alberta	Slave	Contributions to understanding of Slave Structure, evolution.
Geological Studies Yellowknife Volcanic Belt	H. Helmstaedt	Queen's	Slave NST 85/J 8,9,16	Detailed mapping and remapping parts of Yellowknife Volcanic Belt. Maps of areas of belt not mapped in detail. New 1:10 k maps. New 1:50 k maps Yellowknife Bay, Prosperous Lake and Quyta Lake.
Study of Pegmatites Yellowknife Supracrustal Basin	P. Cerny	Manitoba	Slave NST 85 NE	Preliminary reports Ph.D. Thesis and Final memoir contribution to the genesis of Yellowknife basin rare element pegmatites.
Blatchford Lake Alkaline Complex Preliminary investigation	D. Smith	Alberta	Slave/Bear NTS 85I/	Proposal for economically oriented minerological research.
Petrogenesis of Slave Province Volcanic Belts	A.M. Goodwin	Toronto	Slave	Papers on petrogenesis of Slave Volcanic rocks. Thesis relations to ore deposits and comparisons to Superior Provinces.
Geology and Geo-chemistry of the Tsu Lake area	D. Smith	Alberta	Churchill NTS 75D/	Papers analysing high grade rocks and evolution of part of the Churchill Structural Province: Ph.D. Thesis.
Structure, Sedimentology evolution and mineral potential of the Nonacho Basin	J.A. Donaldson	Carleton	Churchill NTS 75/SW	Various papers and detailed maps on Nonacho Basin plus a 1:250,000 k compilation and Ph.D. Thesis.
Stratigraphy and Sedimentology of Thelon Formation regoliths and relations to Uranium Mineralization	J.A. Donaldson	Carleton	Churchill	M.Sc. Thesis, various papers (Joint with GSC).
Mapping Quaternary deposits, Richardson River Basin	D. St-Onge	Ottawa	Slave/Bear NTS 86	1:250 k Regional map of Coppermine River Valley. Detailed studies, reports and thesis.
Detailed Geological mapping Ellington Lake area	J. Moore	Carleton	Bear	Detailed geological maps and studies of Bear Province Volcanics and Volcaniclastics. M.Sc. Thesis.
Geochronological studies Slave and Bear plus detailed mapping in Dumas Lake area	R. VanSchmus	Kansas	Bear NTS 86K	Geological map and Geo-chronology of Bear Province.
Geological Mapping and Sedimentology of the Cape Crawford Formation on the Brodeur Peninsula	B. Jones	Alberta	Arctic Platform NTS 48 SW	Sedimentological studies, economic evaluation. Maps and section Ph.D. Thesis.
Mapping of Frobisher's Mine, Frobisher Bay	D. Hogarth	Ottawa	Archeological Geology NTS 25I/14	Evaluation of Frobisher's Mining Ventures, Baffin Island.

the report on exploration in the Nahanni District has been moved from Chapter 8 to Chapter 3 and, 2) under the heading "REFERENCES" in Chapters 3 to 8 is included the document number(s) of the assessment report(s) that was used as source material for the write-ups. These document numbers are given to documents when they are indexed for inclusion in the computerized Geoscan-Minisis System.

The Geology Division Archive has been reorganized according to these numbers in place of the National Topographic System (NTS) method used prior to 1984. This has required a major reorganization and review of all assessment documents and creation of a NTS cross reference system. The new system will permit far better control and better maintenance of the archival material.

Division Publications

The Geology Division produces a dozen releases in the EGS series each year. A list of these in chronological order of release is included on the next page.

A number of releases in preparation in this

STATUS

Numerous reports published.

Numerous reports published.

Work continuing most areas of belt now mapped in detail and preliminary maps published. New detailed compilation maps are being prepared. First releases expected early 1985. Numerous auxillary studies have developed from this overall project begun by Department Staff in 1975.

Preliminary papers published. Various thesis in preparation.

Program recorded and a study is in progress.

Sampling of Yellowknife Volcanic Belt completed and geochemical done.

Field and laboratory work complete. Thesis expected fall 1984.

Field work completed. Thesis expected fall 1984. Maps 84/85.

All phases contemplated completed. Future work possible.

Part of long term project to investigate glacial and post-glacial sediments on Northern Slave and Bear Provinces.

Field work almost completed (as of 1984). Map expected 1984 or Spring 1985. Thesis 1986.

A number of maps and reports have been produced.

Field work completed (1984). Preliminary papers submitted. Work continues.

Papers and reports on one of First NWT Mining ventures.

series include maps displaying the geology of the proterozoic Nonacho Basin by L. Aspler. These will include a 1:250,000 complilation of the whole basin, and more detailed (1:50,000) maps of the basin.

Another set of maps showing the regional geology of the Hornby Basin including the Dismal Lake (86N) area by Ross, Kierans and Donaldson is nearly ready.

A set of compilations of the geology of the Yellowknife Volcanic Belt, parts of 85 J/8, 9 and 16, are in preparation. These will be produced at 1:10,000 scale and later compiled at 1:50,000 as part of new maps for Yellowknife Bay, (J/8), Prosperous Lake (J/9) and Quyta Lake (J/16).

LIST OF PUBLICATIONS AVAILABLE
FROM THE GEOLOGY DIVISION
NORTHERN AFFAIRS PROGRAM
BOX 1500
YELLOWKNIFE, N.W.T.
X1A-2R3

UPDATE: OCT 17, 1984

Please note: Orders must be accompanied by payment: Cheques or Money orders must be payable to The Receiver General of Canada.

Mineral Industry Reports (MIR)

MIR 1969-70 ($2.00)
Vol. 2, Northwest Territories, east of 104° W longitude; by P.J. Laporte; DIAND, 1974.

MIR 1969-70 (n/c)
Vol. 3, Northwest Territories west of 104° W longitude; by Theresa Padgham, T.W. Caine, D.R. Hughes, C.W. Jefferson, M.W. Kennedy and J.D. Murphy; DIAND, EGS 1978-6.

MIR 1971-72 ($2.50)
Vol. 2, Northwest Territories, east of 104 W longitude; by P.J. Laporte; DIAND, 1974.

MIR 1971-72 ($3.00)
Vol. 3, Northwest Territories, west of 104 longitude; by W.A. Padgham, M.M. Kennedy, C.W. Jefferson, D.R. Hughes and J.D. Murphy; DIAND, EGS 1975-8.

MIR 1973 ($3.75)
Northwest Territories; by W.A. Padgham, J.B.Seaton, P.J. Laporte and J.D. Murphy; DIAND ,EGS 1976-9.

MIR 1974 ($4.50)
Northwest Territories; by W.A. Gibbins, J.B. Seaton, P.J. Laporte, J.D. Murphy, E.J. Hurdle and W.A. Padgham; DIAND, EGS 1977-5.

MIR 1975 ($6.00)
Northwest Territories; by P.J. Laporte, W.A. Gibbins, E.J. Hurdle, C.C. Lord, W.A. Padgham and J.B. Seaton; DIAND, EGS 1978-5.

MIR 1976 (n/c)
Northwest Territories; by C.C. Lord, P.J. Laporte, W.A. Gibbins, E.J. Hurdle, J.B. Seaton and W.A. Padgham; DIAND, EGS 1978-11.

MIR 1977 (n/c)
Northwest Territories; by C.C. Lord, P.J. Laporte, W.A. Gibbins, J.B. Seaton, J.A. Goodwin and W.A. Padgham; DIAND, EGS 1981-11.

MIR 1978 ($7.50)
Northwest Territories; by J.A. Goodwin, P.J. Laporte, C.C. Lord, W.A. Gibbins, J.B. Seaton and W.A. Padgham; DIAND, EGS 1983-2.

MIR 1979 ($7.50)
Northwest Territories; by J.A. Brophy, W.A. Gibbins, P.J. Laporte, C.C. Lord, W.A. Padgham and J.B. Seaton; DIAND, EGS 1983-9.

MIR 1980-81 ($10.00)
Northwest Territories; by J.A. Brophy, W.A. Gibbins, P.J. Laporte, C.C. Lord, W.A. Padgham and J.B. Seaton; DIAND, EGS 1984-5.

Exploration Overviews (no charge)

1974
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1975
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1976
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1977
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1978
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1979
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1980
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1981
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1982
Mineral exploration in the Northwest Territories; by the staff of the Geology Division, DIAND, Yellowknife, NWT.

1983
Mining, Exploration and Geological Investigations, Northwest Territories; by the staff of the Geology Division and others, DIAND, Yellowknife, NWT.

1984
Mining, Exploration and Geological Investigations, Northwest Territories; by the staff of the Geology Division and others, DIAND, Yellowknife, NWT.

MINERAL OVERLAY MAPS

Charges: .0015 mylar copies, $2.50/sheet; paper copies, $1.00/sheet.

These maps are designed as overlays to Geological Survey of Canada geology maps ("A" series and Preliminary series) and 1:250,000 Topographic maps where geology maps are unavailable.

All mineral showings recorded in the Northwest Territories at the time of compilation have been plotted on overlays.

48A (1235A)	76F (topo)	86D (topo)
55E (9-1970)	76G (1267A)	86E (topo)
55F (10-1970)	76H (topo)	86F (1014A)
55K (6-1972)	76I (topo)	86G (topo)
55L (1285A)	76J (topo)	86H (topo)
65C (24-1970)	76K (topo)	86I (topo)
65H/10,11,14,15	76L (topo)	86J (topo)
(P. 69-52)	76M (topo)	86K (topo)
65H (15-1970)	76O (topo)	86K/15 (1011A)
65I (16-1970)	76P (topo)	86L (topo)
65L (topo)	77A (topo)	86M (topo)
66M (topo)	85G (topo)	86N (1338A)
75A (1199A)	85H (50-28A)	86O (1337A)
75C (1203A)	85I (581A)	86P (topo)
75D (607A)	85I/14 (645A)	86C,D,E,F (5-1971)
75E (525A)	85J (topo)	95E (1313A)
75F, G west 1/2	85J/8 (709A)	95F (22-1960)
(1281A)	85J/9 (868A)	95J (22-1961)
75K (1123A)	85K (topo)	95M (1315A)
75L (122A)	85N (topo)	95O (1373A)
75M (738A)	85N/7 (1230A)	96A,B,G,H
75M/2 (1198A)	85N,O (690A)	105I (8-1967)
75M,75O (1024A)	85O (topo)	105P (1333A)
75N (1013A)	85O (49-14)	106A (topo)
75O (topo)	85O/14 (1021A)	106B (topo)
76B (topo)	85O,P (1017A)	106C (topo)
76C (1031A)	85P (51-8)	106F (topo)
76D (977A)	85P/3 (644A)	
76D (1025A)	86A (1219A)	
76E (topo)	86B/3 (1022A)	
76E,86H (8-1966)	86B/6 (1023A)	
76E/11,14 (12-1965)	86B,C (697A)	
76E/14 (10-1966)	86C (1224A)	

Open File Geological Maps and Reports on the NWT

(by NWT Geology Division)

G.S.C. Open File 129 ($15.00)
Lake sediment geochem. sampling of the Yellowknife, Indin Lake and portions of Cameron River and Beaulieu River greenstone belts; D. Nickerson (85B/6; 85I/10,11,14,15,16; 85J/8,9; 85 O/14; 86P/1,2,8). 14 maps and 1 text.

G.S.C. Open File 135 ($5.00)
Geology of Camsell River silver district, NTS 86E/9; by R.M. Shegelski and J.D. Murphy. 2 maps and text.

G.S.C. Open File 179 ($2.00)
Preliminary geological map Rankin Inlet, NTS 55K/16; by P.J. Laporte and S.K. Frape. 1 map.

G.S.C. Open File 199 ($2.00)
Geological map of White Eagle Falls area, NTS 86F/12; by W.A. Padgham, R.J. Shegelski, J.D. Murphy and C.W. Jefferson. 1 map.

G.S.C. Open File 208 ($2.00)
Geological map of High Lake area, NTS 76M/7; by W.A. Padgham, R.J. Shegelski, D.R. Hughes and C.W. Jefferson. 1 map.

G.S.C. Open File 239 ($4.00)
Geology of two base metal deposits in the Slave Structural Province (High Lake copper-zinc deposit, NTS 76M/7, and Indian Mountain Lake zinc-lead-silver-copper deposit NTS 75M/2); by W.L. Johnson. 2 maps and text.

EGS 1975-1, 1975-2, 1975-3 ($3.00/map)
Preliminary geology maps of Hackett River, 76G/13, G/12, G/5 (part), scale 1:31,680; by W.A. Padgham, M.P.D. Byran, C.W. Jefferson, E.A. Ronayne and V.Z. Sterenberg.

EGS 1976-4, 1976-5, 1976-6, 1976-7, 1976-8 ($3.00/map)
Preliminary geology maps of Hackett River, 76K/2, F/9, K/1, F/15, F/16, scale 1:31,680; by C.W. Jefferson, W.A. Padgham, M.P.D. Byran, R.J. Shegelski, E.A. Ronayne, H. Vandor and L. Thorstad.

EGS 1976-1 see 1981-4

EGS 1976-2 ($3.00)
Preliminary geology map of Ferguson Lake, 65I/15, scale 1:31,680; by K.R. Barrett, P.J. Laporte and S.R. Leggett.

EGS 1976-3 ($3.00)
Preliminary geology report of Baker Lake, 56D/2 (part), D/7 (part), 1 text, surficial and bedrock geology maps, scales 1:15,840 and 1:1,000 by K.R. Barrett, P.J. Laporte and S.R. Leggett.

EGS 1976-17, 1976-18 ($3.00/map)
Preliminary geology maps of Takijug Lake, 86I/1 and 86I/2, scale 1:31,680; by R.S. Hyde, H.A. McLeod, B.T. Scribbins and S. Taylor.

EGS 1978-1 ($3.00)
Preliminary geology map of Amer Lake, 66H/7, scale 1:31,680; by P.J. Laporte, K.R. Barrett and G. Schwab.

EGS 1978-2 ($8.00)
1977 Exploration activity in the Keewatin District. One index map and eight maps outlining the geology and property ownership in seven active areas of the Keewatin. Prepared by P.J. Laporte for presentation at the Dec./77 Geoscience Forum in Yellowknife.

EGS 1978-4 ($3.00/map)
Preliminary geology maps of 86H/14,15,16. District of Mackenzie, NWT, scale 1:31,680; by A.F.S. Bau, L.B. Aspler and E.J. Hurdle.

EGS 1978-8 ($3.00) (Also appears in MIR-76, EGS 1978-11)
Surficial geology, permafrost and related engineering problems, Yellowknife, 85J/8; 1 map, scale 1:6,000; text by L.B. Aspler.

EGS 1979-2 a,b,c ($3.00/map)
Preliminary geology maps of 86H/9,10,11; scale 1:31,680; by A.F.S. Bau, S.P. Goff, M.J. Yakey.

EGS 1979-3 ($3.00)
Litho-stratigraphic map of northeast half of Great Bear Lake, 86K/4,5, scale 1:50,000; by R.S. Hildebrand.

EGS 1979-7 ($3.00)
Preliminary geology map of 76D/3,6; Courageous Lake, scale 1:12,000; by H. Dillon-Leitch.

EGS 1979-9 ($3.00)
Preliminary geology map of the southern end of the Yellowknife Greenstone Belt, 85J/7 (part), J/8 (part), scale 1:7,500; by H. Helmstaedt, J.A. Goodwin, J.G. Patterson and J. King.

EGS 1979-10 ($3.00)
Preliminary geology map of the northern end of the Yellowknife Greenstone Belt, 85J/9, scale 1:8,500; compilation of 1975, 1976, 1977 and 1978 mapping by DIAND Geology crews; L.M. Hauer.

EGS 1979-11 ($3.00)
Preliminary geology map of eastern Point Lake, 86H/1,2 (part), scale 1:31,680; by J.A. Goodwin, H. Helmstaedt, J. King, R. Boodle and S. Pinard.

EGS 1979-12 see 1980-9

EGS 1980-1 ($3.00)
Petrographic report of rocks in the Amer Lake area, District of Keewatin, 66H/10 and 66H/7; by J.G. Patterson.

EGS 1980-2 ($9.50)
Stratigraphy, Sedimentation & Tectonism in the Hornby Bay and Dismal Lakes Groups, Proterozoic, NWT, 86J,K,L,M,N,O,;by C. Kerans, G.M. Ross and J.A. Donaldson, 25 page report including 24 figures, excerpt from 1977 M.I.R.

EGS 1980-5 ($4.00)
Preliminary geology map of Banting and Walsh Lakes area, 85J/9, scale 1"=800'; by H. Helmstaedt, J. King, and R. Boodle.

EGS 1980-9 ($4.00)
Preliminary geology map, Eastern end of the Amer Belt, NTS 66H/7,8,9,10, scale 1:31,680, update of EGS 1979-12; by J.G. Patterson from mapping by K. Barrett in 1977 and J.G. Patterson in 1979 and 1980. 2 maps.

EGS 1980-10 ($8.00)
Preliminary geology map of eastern Point Lake, 86H/7,8 (part), scale 1:31,680; by J.E. King, R. Boodle and M.R. St-Onge.

EGS 1981-1 ($3.00) (Superseded by G.S.C. open file 930)
Preliminary geology map of Rainy Lake and White Eagle Falls, NTS 86E/9, scale 1:50,000; by R.S. Hildebrand.

EGS 1981-2 ($4.00)
Proposed Mineral Exploration Activity, District of Keewatin, scale 1:1,000,000; by P.J. Laporte.

EGS 1981-3 ($5.00)
Geology of the Walsh Lake area, 85J/9, scale 1:10,000 by R.M. Easton and V. Jackson.

EGS 1981-4 ($8.00)
Geology of the Heninga-Turquetil-Carr Lakes area, Northwest Territories, 2 maps, scale 1:31,680 covering 65H/16, 55E/13, 55L/4 and 65I/1; by P.J. Laporte, K.R. Barrett, S.R. Leggett. (This open file replaces 1976-1).

EGS 1981-5 ($8.00)
Geology of the Western Part of Point Lake, NTS 86H, all of H/4,5 and the west halves H/3,6; scale 1:30,000, 4 maps; by R.M. Easton, R.L. Boodle, L. Zalusky, G. Eiche and D. McKinnon.

EGS 1982-1 ($5.00)
Preliminary Geology maps of Kamut and Adams Lakes area in the North Central Wopmay Orogen, District of Mackenzie, NWT 86K/8,9, scale 1:25,000; by S.A. Bowring.

EGS 1982-2 ($4.00)
Proposed Mineral Exploration Activity, District of Keewatin, scale 1:1,000,000; by P.J. Laporte.

EGS 1982-3 ($5.00)
Preliminary Geology map of Taltheilei Narrows 75L/12 - Point Busse area, scale 1:14,000; by Karen S. Pelletier.

EGS 1982-4 ($5.00)
Geology of Keskarrah Bay area, Slave Structural Province, District of Mackenzie, 86H/6,7 NWT; by Valerie Jackson. 1 map.

EGS 1982-5 ($5.00/map)
Geology of the East side of Yellowknife Bay, 85J/8,9 scale 1:10,000; by R.M. Easton, C. Ellis, H. Helmstaedt, V. Jackson, B. O'Hearn and M. Dean. 3 maps and notes.

EGS 1982-6 ($8.00)
Geology of the Typhoon Point map area, High Lake Greenstone Belt, District of Mackenzie, NWT, 76M/10, 76M/15 (south half), scale 1:31,680; by R.M. Easton, C. Ellis, M. Dean and G. Bailey.

EGS 1982-7 ($5.00) (See also EGS 1983-6)
Preliminary Geology Compilation of the Hepburn Island map area, 76M scale 1:125,000; by R.M. Easton.

EGS 1983-1 ($5.00)
Proposed Mineral Exploration Activity, District of Keewatin, scale 1:1,000,000; by P.J. Laporte.

EGS 1983-3 ($5.00)
A compilation of isotopic dates for the Slave-Structural Province, report by R.M. Easton. 2 maps.

EGS 1983-4 ($15.00)
Geology of the Rankin Inlet area, NTS 55/K, by P.J. Laporte, S.K. Frape and S.R. Leggett. 4 maps and a 50 page report.

EGS 1983-5 ($5.00 ea./$15.00 set)
Geology of a Volcanic Pile at Clan Lake, NTS 85I/13, scale 1:10,000; by E. Hurdle. 3 maps and notes.

EGS 1983-6 ($4.00)
Preliminary geological compilation of western Hepburn Island map area, NWT; NTS 76M/west 1/2, scale 1:125,000; by G.M. Yeo. 1 map.

EGS 1983-7 ($3.00)
Preliminary Geological Compilation of Quyta Lake area, NWT; parts of NTS 85J/9,16, scale 1:50,000; by G.M. Yeo. 1 map and notes.

EGS 1983-8 ($24.00 set, $4.00 each)
Preliminary geology of western Hepburn Island map area, NWT; NWT 76M/west 1/2, scale 1:31,680; by G.M. Yeo, G. Bailey, J. Crux, B. Fischer, V. Jackson, C. Relf and J. Wahlroth. 6 maps.

EGS 1983-10 (N/C)
A Layperson's Geological Guide to the Long Lake Park Hike Trail. Designed for the non-geologist and illustrated with maps and sections, this report is an introduction to the geology of Long Lake Park (part of NTS 85J/8) and a geological guide to a four-km park trail that traverses the lower part of the Kam Formation; by J.A. Brophy.

EGS 1983-11 (N/C)
Gold Deposits of the Northwest Territories; Classes, styles, genesis, exploration method and success probabilities; by W.A. Padgham.

EGS 1984-1 ($5.00)
Proposed Mineral Exploration Activity, District of Keewatin, scale 1:1,000,000; by P.J. Laporte. 1 map.

EGS 1984-2 ($5.00)
Index to Geological, Geochemical and Surficial Geology reports, Keewatin District; by P.J. Laporte. 1 map and 1 report.

EGS 1984-3 ($5.00)
Preliminary Geological Map of Rutledge Lake, NTS 75E/10, scale 1:50,000 by N.G. Culshaw. 1 map and notes.

EGS 1984-4 ($10.00)
Geology of the Courageous Lake-Mackay Lake Greenstone Belt, NWT; parts of NTS 75M/14,15 and 76D/2,3,5,6, scale 1:24,000; by H.C.H. Dillon-Leitch. 4 maps adjoin GSC map 1024A.

EGS 1984-6 ($5.00)
Contributions to the Geology of the Northwest Territories Vol. 1; editor J.A. Brophy.

MISCELLANEOUS MAPS AND REPORTS:

The Geochemistry of Lake Sediments in the Yellowknife River Area, NWT; by Robert G. Jackson, Department of Geological Sciences Queen's University May 1973 ($6.00).

Coal Deposits in the Arctic Archipelago, NWT; by T.W. Caine, 1973 ($2.00).

Soapstone Deposits of the NWT; by J.D.Murphy, 1973 ($5.00).

Property ownership maps showing all mineral claims in good standing and prospecting permit areas in the NWT plotted on 1:250,000 topographic maps. Lists of owners, staking dates included. Order by NTS map number ($1.00/sheet).

Coal Occurrences of the Western Mainland of the NWT; by J.A. Goodwin, 1978 ($2.00).

THE FOLLOWING PAPERS ARE AVAILABLE FREE OF CHARGE:

A survey of the uranium content of surface waters at two drill sites: Thirty Mile Lake and Long Lake, District of Keewatin, NWT; by P.J. Laporte, R.N. Soniassy and J.A. Brophy.

Mining Developments, Mineral Inventory and Metallogenic Models: Arctic Regions, NWT, Canada; by Walter A. Gibbins, 1982; in Arctic Geology and Geophysics Proceedings, 3rd International Symposium on Arctic Geology; Can. Soc. Pet. Geol., Mem. 8.

Copies of these manuscripts can be examined at the Geology Office, DIAND Yellowknife:

Exploration for lead-zinc in the Selwyn and Mackenzie Mountains, Yukon and Northwest Territories; by J.D. Murphy and W.D. Sinclair. Paper presented at the Prospectors and Developers Convention, Toronto, Ontario, 1974.

Mineral potential of the Northwest Territories; by W.A. Padgham. Published in the Geology of the Canadian Arctic. Editors: J.D. Aitken and D.J. Glass. Special publication C.S.P.G. and G.A.C., 1974.

1981 Index to mining assessment reports

Lead-Zinc Mineralization in the Central Dolomite Belt of the Lower Cambrian Sekwi Formation; by W.J. Crawford. Paper presented at Geoscience Forum, Yellowknife, NWT, 1974.

Lake sediment geochemistry as a guide to detection of massive sulphide deposits in the southern Slave Province; by R. Jackson and I. Nichol. Paper presented at the Geoscience Forum, Yellowknife, NWT, 1974.

Carbonate hosted lead-zinc deposits of the Northwest Territories; by W.A. Gibbins. Presented at the First Annual CIM District 4 meeting, Thunder Bay, Ontario, 1976.

An Archean Ignimbrite at Yellowknife and its Relationship to the Kam Formation Basalts; Precambrian Research, 12 (1980), p. 99-113; by W.A. Padgham.

Archean Crustal Evolution-A Glimpse From The Slave Province; by W.A. Padgham; Archean Geology, Spec. Publ. Geol. Soc. Aust. 7 (1981), p. 99-110.

* Gold Deposits of the Northwest Territories; by W.A.Padgham. (174).

* Geology of the Southwest End of the Yellowknife Greenstone Belt; by H. Helmstaedt, J. King, J.A. Goodwin and J.G.Patterson. (223).

* Gold and Precambrian Iron Formation in the Northwest Territories; by W.A. Gibbins. (258).

* Geology of the Yellowknife Volcanic Belt; by W.A. Padgham. (288).

* B-Zone Deposit, Cullaton Lake, District of Keewatin, Northwest Territories; by Charles E. Page. (323).

Sandstone, Stratigraphy and Uranium Potential of the Eastern Hornby Bay Basin; by G.M. Yeo; from Mineral Industry Report 1977, EGS 1981-11.

A Preliminary Analysis of the Mountain and Keele Diatremes NWT; by A.E. Oldershaw; from Mineral Industry Report 1977, EGS 1981-11.

Lead Isotope Study of Carbonate-hosted Pb-Zn Deposits in and near the Mackenzie Mountains, Northern Canadian Cordillera; by C.I. Godwin, A.J. Sinclair, Barry D. Ryan and W.F. Slawson; from Mineral Industry Report 1977, EGS 1981-11.

Mississippi Valley Type Lead-Zinc Districts of Northern Canada; by W.A. Gibbins; in Int. Conference on MVT lead-zinc deposits, Proceedings, Univ. of Missouri, Rolla, Missouri.

NWT Mineral Potential map plus list of deposits and names of producing mines.

* Reprints from the "Proceeding of the Gold Workshop, Yellowknife, NWT, Dec. 3-7, 1979; R.D. Morton, ed., 1981." A second printing of this volume should be available in the near future.

** Sedimentology of the Snowblind Bay Formation, a Preliminary Report; by I. Muir and B.R. Rust.

** Stratigraphy of an Upper Silurian Carbonate Shelf Sequence on Cornwallis and nearby Islands; by J. Packard and O.A. Dixon.

** Geological Studies of Rare-Element Pegmatites in the Yellowknife Basin, NWT; by R.E. Meintzer and P. Cerny.

** Progress Report on Geological Studies in the Great Bear Lake area; by W.R. VanSchmus and S.A. Bowring.

** Magnetite-Associated Uranium Deposits of the Wopmay Fault; by R. Miller.

** Preliminary Report on the Clan Lake Volcanic Complex; by E. Hurdle.

** Preliminary Report on the Keskarrah Bay map area, Slave Structural Province, NWT; by V. Jackson.

Progress Report on Placer Gold in the Liard River, NWT; by C.Lord.

** Reprints from the "Mineral Industry Report" 1978, EGS 1983-2.

Mineral Potential of the Cordilleran Region, NWT (1978) by C.C. Lord.

Mineral Potential and Geology of Bear Slave Structural Provinces, District of Mackenzie.

Mineral Potential and Geology of S.E. Barren Grounds, parts of District of Keewatin.

Mines and Minerals Activities, North of 60. Published yearly and includes summaries of exploration and mining activities for Yukon and Northwest Territories.

NOTE: GSC memoirs, bulletins and papers are available for viewing at the Geology Division's Archive on the Fourth Floor of the Bellanca Building. GSC open-file releases pertaining to the NWT are available for purchase.

Chapter 2: OPERATING MINES

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INTRODUCTION

Two new mines, Lupin (gold) and Smallwood (silver), came on stream in 1982 to join the ten other mines that operated in the NWT that year (Fig. 2-1): Con, Giant and B-Zone (gold); Eldorado, Silver Bear and Norex (silver); Pine Point, Polaris and Nanisivik (zinc-lead) and Cantung (tungsten). The closure of the Eldorado Mine in 1982 was balanced by the opening of the Salmita gold mine in 1983, thus maintaining the number of mines at 12 and the number of mills at 10 (ores from Silver Bear, Norex and Smallwood are treated at a common mill). Summary information on these operating mines is given in Table 2-1, and metal production for the years 1981 to 1983 is tabulated in Table 2-2. As in previous years, five commodities (gold, silver, zinc, lead and tungsten) accounted for over 99% of the value of NWT metal production in 1982 and 1983.

1982 OVERVIEW

Although prices of the five major commodities mined in the NWT were 10% to 26% lower than those of the previous year (Table 2-3), the value of metal output in 1982 was a record 595 million dollars, 22% more than that of 1981 (Table 2-2). This new record, set despite a climate of economic recession, can be attributed to output from Polaris, B-Zone, Lupin and Cantung. Polaris' first year of full production bolstered lead and zinc output by about 30%.

FIGURE 2-1: Key to operating and developing mines discussed in text. The table at upper left gives the mine name, operator's name, and the 1983 workforce. Developing mines are in italics.

TABLE 2-1: SUMMARY DATA, NWT MINES, 1982-1983

OPERATING MINES:

MINE	COMMODITY	MILLED (1982)	RESERVES (1982)	MILLED (1983)	RESERVES (1983)
Con	Au (Ag, As_2O_3)	212.4 kt @ 12.34 g Au/t	1,905.1 kt 16.1 g Au/t	189.8 kt @ 12.34 g Au/t	1,723.6 kt @ 15.09 g Au/t
Giant	Au (Ag, As_2O_3)	366.1 kt @ 7.2 g Au/t	889.0 kt @ 8.23 g Au/t	297.0 kt @ 7.71 g Au/t	1,016.0 kt @ 7.89 g Au/t
Salmita	Au, (Ag)	development	139.7 kt @ 26.74 g Au/t	11.9 kt @ 15.63 g Au/t	105.2 kt @ 28.10 g Au/t
Lupin	Au, (Ag)	*199.2 kt @ 8.0 g Au/t	3,128.9 kt @ 13.58 g Au/t	323.0 kt @ 12.0 g Au/t	3,080.0 kt @ 13.58 g Au/t
B-Zone (Cullaton Lake)	Au, (Ag)	*65.9 kt @ 17.0 g Au/t	150.0 kt @ 17.0 g Au/t	*102.0 kt @ 17.0 g Au/t	154.2 kt @ 17.14 g Au/t
Eldorado	Ag, (Cu)	7.5 kt @ 0.53 kg Ag/t	depleted	closed down	closed down
Terra (Silver Bear)	Ag (Cu) (Zn) (Ni) (Co) (Pb) (Cd)	*36.1 kt @ 0.74 kg Ag/t (production mainly from Silver Bear)	63.5 kt @ 0.63 kg Ag/t (from all three mines)	37.5 kt @ 0.73 kg Ag/t	not reported
Terra (Norex)				25.3 kt @ 0.69 kg Ag/t	
Terra (Smallwood)				9.5 kt @ 0.21 kg Ag/t	
Pine Point	Zn, Pb	2218.0 kt @ 7.3% Zn, 3.0 % Pb	31,751.3 kt @ 6.1% Zn, 2.4% Pb	894.0 kt @ 8.1% Zn, 2.7% Pb	23,586.7 kt @ 6.3% Zn, 2.7% Pb
Nanisivik	Zn, Pb, Ag, (Cd)	621.8 kt @ 11.2 Zn, 1.4% Pb, 61 g Ag/t	4400 kt @ 11% Zn, 1.5% Pb	628.1 kt @ 11.1% Zn, 1.5% Pb, 58 g Ag/t	3800 kt @ 10.1% Zn 0.8% Pb
Polaris	Zn, Pb	470.0 kt @ 17.0% Zn, 7.0% Pb	9,979.0 kt @15.2% Zn, 4.4% Pb	829.0 kt @ 16.8% Zn, 5.2% Pb	16,873.0 kt @ 14.8% Zn, 4.1% Pb
Cantung	WO_3	327.5 kt @ 1.28% WO_3	2,757.8 kt @ 1.32% WO_3	36.3 kt @ 1.19% WO_3	2,721.5 kt @ 1.32% WO_3

MINES UNDER DEVELOPMENT:

Shear Lake (Cullaton Lake)	Au	———	———	———	1.0 Mt @ 12 g Au/t (Can. Min. J., June/84)
Bullmoose	Au	———	———	———	145 kt @ 10.97 g Au/t (Northern Miner, Dec. 1/83)
Ptarmigan	Au	———	———	———	100 kt @ 11.7 g Au/t

Reserves at operating mines are in the measured and indicated categories. All data on this page are from company annual reports except for those marked with asterisks, which are from the Mining Inspection Service of the Gov't of the NWT. All reserve and production figures have been rounded to the nearest 100 tonnes.

PROVINCE	DEPOSIT TYPE	GEOLOGICAL ENVIRONMENT	N.T.S.
Slave	epigenetic metamorphic hydrothermal	Shear zones in Archean Kam Formation mafic metavolcanics	85J/8 85J/8,9
		Quartz veins at contact; Yellowknife Supergroup metasediments and metavolcanics	76D/3
	syngenetic exhalative	iron-formation in Archean Contwoyto Formation of the Yellowknife Supergroup	76E/14
Churchill		iron-formation in Archean Henik Group metasediments	65G/7,8
Bear	epigenetic magmatic hydrothermal	fault zones in Aphebian Labine Group supracrustals and comagmatic intrusions	86K/4
			86E/9
			86F/12
			86F/12
Interior Platform	Mississippi Valley	Karsted and dolomitized Middle Devonian Pine Point Group carbonates	85B/10, 15,16
Innuitian Platform		Karsted Neohelikian Society Cliffs Formation dolostone	48C/1
Arctic Platform		Karsted and dolomitized Ordovician Thumb Mountain Formation carbonates	68H/8
Cordilleran Orogen	Skarn	Skarns at contact between Cretaceous intrusions and Paleozoic limestone	105H/16
Churchill	epigenetic fracture-filling	fractures in basal Aphebian Hurwitz Group conglomerate lying unconformably above Archean basement	65G/7,8
Slave	epigenetic metamorphic hydrothermal	quartz veins in Archean Yellowknife Supergroup metasediments	85I/7
Slave	epigenetic metamorphic hydrothermal	quartz veins in Archean Yellowknife Supergroup metasediments	85J/9

TABLE 2-2: METAL PRODUCTION SUMMARY, NWT MINES, 1981-83

COMMODITY	MINE	1981 PROD'N ($ x 10^6)	[1]%	1982 PROD'N ($ x 10^6)	[1]%	1983 PROD'N ($ x 10^6)	[1]%
GOLD	Con Giant Camlaren Salmita B-Zone Lupin	2,326 kg 1,825 kg 456 kg --- 14 kg ---		2,471 kg 2,258 kg --- --- 695 kg 1,626 kg		2,219 kg 1,963 kg --- 159 kg 1,147 kg 3,758 kg	
total Au		4,621 kg ($81.88)	8.9	7,050 kg ($104.62)	11	9,246 kg ($155.05)	13
SILVER	Con Giant Camlaren Salmita B-Zone Lupin Terra[2] Eldorado Nanisivik	465 kg 290 kg 148 kg -- -- -- 1772 kg 34,214 kg 32,323 kg		494 kg 459 kg --- --- 31 kg not reported 28,396 kg 3,971 kg 30,160 kg		460 kg 552 kg --- 32 kg 24 kg 287 kg 45,539 kg --- 26,225 kg	
total Ag		69,212 kg ($28.07)	6.1	63,511 kg ($19.97)	5	73,119 kg ($33.1)	6.6
ZINC	Pine Point Nanisivik Polaris	148,064 t 67,967 t 3,437 t		152,791 t 74,791 t 93,331 t[4]		67,643 t 61,042 t 117,630 t[4]	
total Zn		219,468 t ($261.84)	24	320,913 t ($343.70)	33	246,315 t ($283.26)	25
LEAD	Pine Point Nanisivik Polaris	64,443 t 8,234 t 1,058 t		64,322 t[3] 9,379 t 35,649 t[4]		23,203 t 6,396 t 34,623 t[4]	
total Pb		73,735 t ($72.22)	27	109,350 t ($79.02)	40	64,222 t ($37.84)	25
TUNGSTEN TRIOXIDE	Cantung	2,513 t		3,583 t		350 t	
total WO_3		2,513 t ($43.07)	100	3,583 t ($46.61)	100	350 t ($3.76)	100
CADMIUM	Nanisivik	233 t		21 t		none	
total Cd		233 t ($1.23)	22	21 t ($0.06)	?	0 t ($0)	?
COPPER	Eldorado Terra[2]	314 t 10 t		56 t 90 t		--- 115 t	
total Cu		324 t ($0.71)	0.05	146 t ($0.28)	0.02	115 t ($0.24)	0.02
ARSENIC TRIOXIDE	Con Giant	--- 1,094 t		--- 1,780 t		250 t 732 t	
total As_2O_3		1,094 t ($0.36)	?	1,780 t ($0.60)	?	982 t ($0.60)	?
TOTAL VALUE, PROD'N		$489.38		$594.86		$513.85	

Production figures were obtained from the Mining Inspection Service of the Gov't of the NWT, who compile them based on monthly production reports submitted by the mines. Footnotes give production figures from company annual reports when these differ substantially from those reported by the Gov't of the NWT.

:The value of production is calculated using the average annual price of metals shown in Table 2-3.
1:% of total Canadian production based on production figures reported in the Canadian Mining Journal, Annual Mineral Review editions, Feb., 1981-1983.
2:Figures for Terra include the Silver Bear, Norex and Smallwood Mines.
3:58,676 t Pb produced according to Cominco Annual Report.
4:Cominco Annual Reports for Polaris list the following production: 30,200 t Pb in 1982 and 38,900 t Pb in 1983; 74,032 t Zn in 1982 and 132,200 t Zn in 1983.

NOTE: The Mining Inspection Services of the Gov't of the NWT also reports the following small tonnages of production from the Terra operations: 181 t Pb, 118 t Zn, 3 t Ni, 4 t Co, and 5 t Cd. 33 kg of gold were reportedly won from underground development at Ptarmigan.

Production from the new Lupin Mine and from the B-Zone Mine boosted gold output by more than 50%, even though running-in problems at B-Zone significantly reduced projected recoveries. Cantung set a new production record in 1982 that helped to offset the impact of a 24% decline in the price of tungsten. The value of tungsten output was only slightly higher than that of the previous year, despite a 43% increase in production.

Of the five principal commodities mined in the NWT in 1982, only silver registered a decline in value and output relative to 1981. The small amount of silver produced from Eldorado, which closed during the first quarter of 1982, was mainly from the milling of surface stockpiles. Terra Mines Limited's silver mines in the Camsell River area (Silver Bear, Norex and the new Smallwood Mine, which only came on stream late in the year) posted a great gain in production relative to 1981, but not enough to compensate for the closure of Eldorado. Declining production and lower silver prices in 1982 resulted in a 28% decrease in the value of silver output (Table 2-2).

In 1982, the NWT mines accounted for 8.6% of the value of Canadian metal output and directly employed about 2700 persons. According to the Canadian Mining Journal (Feb., 1984), the value of NWT metal production in 1982 was greater than that individually of Manitoba, Saskatchewan, Alberta, the Yukon Territory and all of the Maritime Provinces except Newfoundland.

1983 OVERVIEW

Despite increases in the average annual price of gold, silver and zinc (Table 2-3), the value of non-hydrocarbon mineral production fell to 514 million dollars, about 14% less than that of the previous year. Depressed lead and zinc prices forced Pine Point Mines to shut down on January 2, 1983. Federal and territorial assistance, wage concessions and reductions in transportation and smelter treatment charges enabled the mine to resume operations by June 15, but the value of the NWT's lead and zinc output declined more than 100 million dollars as a consequence of the closure. The price of tungsten continued to drop, forcing Cantung to suspend mining at the end of January and to supply customers from inventory. Mining at Cantung resumed in December, but at a rate reduced to 450 tpd. As a consequence, the value of tungsten output in 1983 was 43 million dollars less than that of the previous year; a decline of 92%. Output at Giant mine was cut back 25% in order to extend the life of the mine, which even at current reduced rates will be exhausted within 4 years unless additional reserves are found or the price of gold increases.

TABLE 2-3: AVERAGE ANNUAL PRICE OF METALS, 1981-1983 (Cdn. funds, used to calculate production values shown in Table 2-2)

METAL	UNIT	1981	1982	% CHANGE 1981-82	1983	% CHANGE 1982-83
Gold	g (oz)	\$17.72 (\$551.18)	\$14.84 (\$461.71)	-16%	\$16.77 (\$521.59)	+13%
Silver	g (oz)	\$0.4056 (\$12.62)	\$0.3144 (\$9.78)	-22%	\$0.4527 (\$14.08)	+44%
Zinc	kg (lb)	\$1.193 (\$0.5424)	\$1.071 (\$0.4867)	-10%	\$1.15 (\$0.5227)	+7.4%
Lead	kg (lb)	\$0.9745 (\$0.4452)	\$0.7226 (\$0.3284)	-26%	\$0.5892 (\$0.2678)	-18.5%
WO_3	kg (lb)	\$17.14 (\$7.79)	\$13.01 (\$5.92)	-24%	\$10.74 (\$4.88)	-17%
As_2O_3	kg (lb)	\$0.334 (\$0.152)	\$0.335 (\$0.152)	none	\$0.606 (\$0.275)	+181%
Cadmium	kg (lb)	\$5.26 (\$2.39)	\$2.71 (\$1.23)	-48%	\$2.20 (\$1.00)	-19%
Copper	kg (lb)	\$2.208 (\$1.00)	\$1.94 (\$0.8824)	-12%	\$2.09 (\$0.9507)	+8%

Sources

Gold, silver, zinc, lead and copper prices from Canadian Mining Journal, Feb. 1983, Feb. 1984.
WO_3 price from Cantung Annual Reports, 1981 to 1983.
Cadmium and As_2O_3 prices from Government of the N.W.T., Mining Reports, 1981 to 1983.

The performance of the precious-metal mines, particularly Lupin and B-Zone, partly salvaged what otherwise would have been a dismal year for the NWT mining industry. The Lupin Mine had its first year of full production, a year that saw the mill capacity expanded 20% to 1100 tpd. Output from the B-Zone Mine almost doubled after operational problems experienced in 1982 were resolved under new management by Camchib Resources Incorporated. Giant Yellowknife Mines Limited brought the Salmita gold mine into production in August, and Cominco won 33 kg of gold from underground development at the Ptarmigan Mine (production from Ptarmigan is not included in Table 2-2). The value of gold output from the NWT in 1983 was 155 million dollars, about 50% more than that of the previous year and almost double that of 1981. The NWT's share of Canadian gold production climbed from 9% in 1981 to 13% in 1983.

The value of silver output in 1983 was 33 million dollars, 65% more than that of the previous year. This improvement reflects higher silver prices and increased production from the Silver Bear, Norex and Smallwood mines of Terra Mines Ltd. In 1983, Terra announced plans to double the capacity of their mill from 225 tpd to 450 tpd.

In 1983, the NWT mines accounted for 7.1% of the value of Canadian metal ouput and directly employed about 2500 persons.

FUTURE DEVELOPMENTS

Three gold mines (Table 2-1) may come on stream in the near future: Bullmoose (Terra Mines Limited), Ptarmigan (Cominco) and Shear Lake (Cullaton Lake Gold Mines Limited). Bullmoose and Ptarmigan, both of which produced briefly during the early 1940's, are small quartz-vein deposits hosted in Archean turbidites of the Yellowknife Supergroup. The Shear Lake deposit is 5 km from the B-Zone Mine and is hosted in Aphebian quartzite of the Hurwitz Group.

Plans to develop the Prairie Creek silver-lead-zinc deposit, reported as a potential producer in the previous Mineral Industry Report (Brophy, 1984), were placed on hold in mid-1982 because of a slump in metal demand and prices. Recently, the Ontario Securities Commission issued a cease-trading order on shares of Cadillac Explorations Limited, the majority owner of the deposit. Litigation is in progress and it is unlikely that Prairie Creek will be brought to production in the near future.

Shear Lake Deposit

Shear Lake is the most interesting of the gold deposits that may soon come on stream. It is hosted in sheared, highly oxidized, pyritic quartzite of the Aphebian Hurwitz Group. A 425-m decline that reached the 60-m level late in 1983 intersected several previously undiscovered gold-bearing shear zones. A reserve potential of about 1.0 Mt grading 12 g Au/t above the 180-m level is indicated.

Little has been written about this deposit, but it is interesting to speculate on similarities between the geological setting of Shear Lake and that of the gold mines in the Rand (Witwaterstrand area of South Africa). The Hurwitz Group is the same age (Aphebian) as the Witwaterstrand Series and, for the most part, consists of the same kind of rock (quartzite and conglomerate). Both the Hurwitz Group and the Witwaterstrand Series are metamorphosed to lower greenschist facies and, over large areas, lie unconformably on Archean basement rocks that themselves were metamorphosed prior to deposition of the Aphebian sediments (Eade, 1974; Boyle, 1979). The Archean basement in both areas is known to host gold deposits (Laporte, 1984; Elevatorski, 1981) and may be a source for the gold in the overlying Aphebian sediments. The Aphebian sediments in both areas accumulated in large basins and were derived from a mature, cratonic source. Most of the Witwaterstrand gold deposits are syngenetic accumulations (paleo-placers) in reefs of pyritic, quartz-pebble conglomerate, but the possibility exists that gold at Shear Lake has been remobilized from a similar setting. It is also perhaps more than coincidental that uranium is often associated with the Witwaterstrand gold ores, and that the Aphebian sediments hosting the Shear Lake deposit have been the focus of uranium exploration for several years (Laporte, 1984).

Padgham (1984) reports 17 gold showings in the Aphebian Hurwitz Group. Based on published information by others, he suggests that the gold at Shear Lake may have been mobilized from underlying Archean basement and deposited in the shears.

FORMAT OF CHAPTER 2

In this chapter, the operating mines are discussed in the same sequence as they are listed in Table 2-1. Furthermore, they are subdivided into four groups according to the main commodity produced: gold

(Con, Giant, Salmita, Lupin and B-Zone); silver (Silver Bear, Norex and Smallwood); lead-zinc (Pine Point, Nanisivik and Polaris) and tungsten (Cantung). An introduction is written to provide an overview for each group. The Eldorado Mine, which only produced during the first quarter of 1982, is not described in detail in this Mineral Industry Report (MIR). For more information on Eldorado, the reader is referred to the 1980-81 MIR (Brophy, 1984). The discussion of each mine includes a section entitled REFERENCES, under which an abbreviated bibliography of papers pertinent to the deposit is presented. A complete reference list that includes all sources named in the text is appended to the end of the chapter. The SI (metric) system is used throughout this chapter. For those unfamiliar with the SI system, a list of relevant conversions to the Imperial system is given in Table 2-4.

TABLE 2-4: KEY TO ABBREVIATIONS AND METRIC/IMPERIAL CONVERSION TABLE

g	= grams
t	= tonne
tpd	= tonnes per day
Mt	= megatonnes = 10^6 tonnes
kt	= kilotonnes = 10^3 tonnes
oz	= troy ounces
ton	= short ton

31.103 g	= 1 oz
34.286 g/t	= 1 oz/ton
0.90718 Mt	= 10^6 tons
0.90718 kt	= 10^3 tons
1 g	= 0.03215 oz
1 g/t	= 0.02917 oz/ton
1 t	= 1.1023 tons
1 Mt	= 1,102,311 tons
1 kt	= 1,102.31 tons

To avoid duplication, most mines are described more briefly than in the previous MIR, although the new mines are discussed in detail. For more elaborate descriptions of the older mines, refer to the 1980-1981 MIR (Brophy, 1984).

GOLD MINES: CON, GIANT, SALMITA, LUPIN, B-ZONE

INTRODUCTION AND REVIEW

Twenty-four mines have contributed to the NWT's gold output since production began in 1935, but only 11 (Fig. 2-2) have produced more than 100 kg of gold. Of these 24 mines, all but two (Fox and B-Zone) are in the Slave Structural Province and are hosted in Archean rocks of the Yellowknife Supergroup (Fig. 2-2). The NWT gold mines can be classified according to the four geological environments in which they are found:

A) in volcanics of the Yellowknife Supergroup (in simple quartz veins or more complex shear zones)
B) at the contact between volcanic rocks and sedimentary rocks of the Yellowknife Supergroup (in strata-bound quartz veins)
C) in iron-formation within Archean turbidites
D) in quartz veins within turbidites of the Yellowknife Supergroup.

Only the Fox Mine, which is in Aphebian sediments of the Athapuscow Aulacogen, does not fit into this four-fold classification.

Two graphs (Fig. 2-3) summarize NWT gold production by mine and by class. The upper graph summarizes almost half a century of gold production and highlights the fact that deposits in the volcanic-hosted class have been by far the most prolific gold producers. About 87% of the NWT's gold output has come from shear zones and quartz veins in the Yellowknife Volcanic Belt (Con and Giant mines). Another 10% has come from three mines at volcanic-sedimentary contacts, and about 2% from two deposits hosted in iron-formation. The remaining seventeen mines, all turbidite-hosted quartz-vein deposits, have accounted for only 1% of NWT gold output. The explorationist should be aware that these deposits tend to be small, irregularly mineralized and difficult to mine profitably. On the other hand, shear zones in volcanics, volcanic-sedimentary contacts and turbidite-hosted iron-formations, all in Archean terranes, appear to be more rewarding targets.

Operating Mines

The five gold mines that operated in 1982 and 1983 include two volcanic-hosted deposits (Con and Giant), two iron-formation-hosted deposits (Lupin and B-Zone) and one contact-type deposit (Salmita). The lower graph in Figure 2-3 summarizes production from these operating mines in 1983 (output from development at Ptarmigan is also included). Immediately obvious is the fact that gold production from the iron-formation-hosted deposits has surpassed that of the volcanic-hosted deposits. In fact, 1983 is the first year that the Yellowknife-area gold mines have not produced most (75% to 90%) of the NWT's gold. With dwindling reserves at Con and Giant, it is

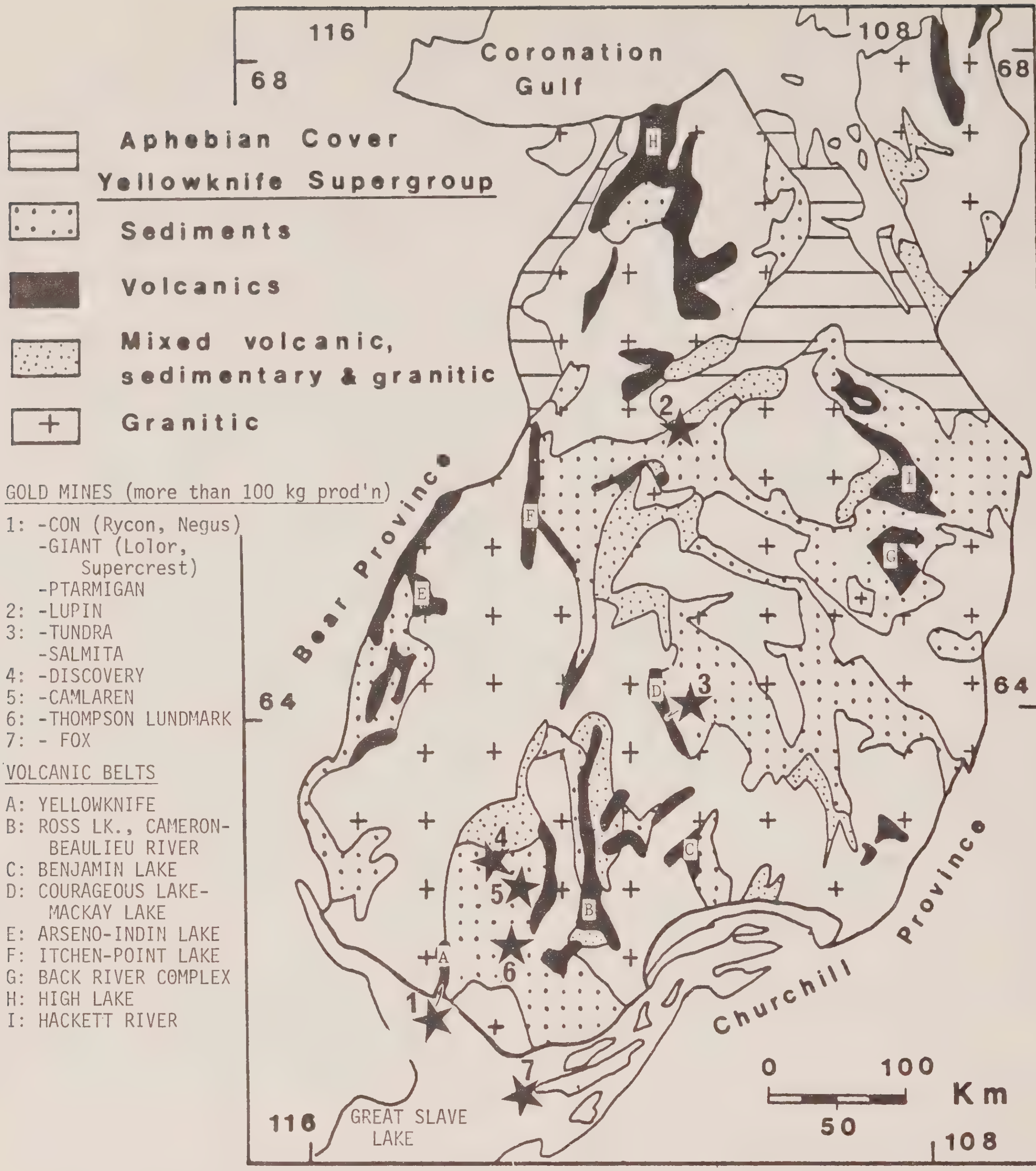


FIGURE 2-2: Generalized geological map of the Slave Structural Province showing the principal volcanic belts and all the gold mines in the NWT that have produced more than 100 kg of gold except B-Zone. Gold mines are marked with bold stars. (after Dillon-Leitch, 1981)

expected that this trend will continue in the years to come.

Volcanic-Hosted Deposits: Con and Giant

The Con and Giant deposits are in the Yellowknife Volcanic Belt (Fig. 2-2) at the western margin of the Yellowknife Supracrustal Basin. The deposits are in sheared mafic volcanics of the upper part of the Kam Formation (Fig. 2-4), the thickest volcanic formation of the Yellowknife Supergroup in the Yellowknife area. Most of the gold is in quartz veins or in chlorite-sericite-carbonate alteration zones in the Campbell and Giant shear systems, which may have once been continuous but are now offset about 5 km by the West Bay Fault (Campbell, 1947; see Fig. 2-4).

The deposits are thought to have been formed from

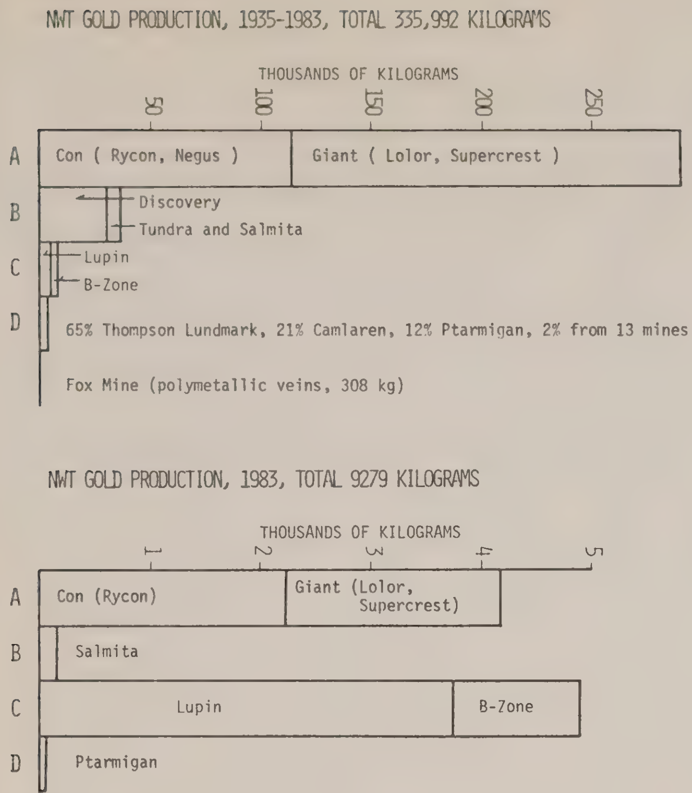


FIGURE 2-3: Gold production in the NWT by mine and by class (discussed in text). A: volcanic-hosted B: at sedimentary-volcanic contacts C: iron-formation-hosted D: quartz veins in turbidites.

gold-bearing solutions derived metamorphically from either the lower part of the volcanic belt or the underlying basement (Myers, 1981). The deposits are at the transition between greenschist- and amphibolite-grade facies of metamorphism (Boyle, 1961; Kerrich, 1981) where style of deformation changes from brittle to ductile (Helmstaedt and others, 1981).

The Con and Giant deposits are dissimilar in some respects. Con ore zones tend to be narrower and shorter in plan length, but longer in dip length than those at Giant. The Campbell system at Con is more strongly sheared than the Giant system, and ore now mined at Con is free-milling and contains less sulphides and arsenides than Giant ore (Padgham, 1975).

Iron-Formation-Hosted Deposits: Lupin and B-Zone

The Lupin Mine in the Slave Structural Province (Fig. 2-2) and the B-Zone Mine in the Churchill Structural Province (Fig. 2-13) are hosted in Archean iron-formation and are considered to be syngenetic-exhalative deposits related to chemical sedimentation at or near sites of fumarolic brine emission onto the sea floor (Gibbins, 1981). Gold in both deposits is associated with sulfide-rich iron-formation (mainly pyrrhotite, pyrite and arsenopyrite), although silicate-rich iron-formation is present at Lupin and silicate, oxide and carbonate-rich iron-formations have been documented at B-Zone. The mines have been compared to other Archean iron-formation-hosted gold deposits in the world such as the Homestake Mine in South Dakota and the Pickle Crow Mine in northwestern Ontario (Gibbins, 1981; Page, 1981). Although the gold grades at Lupin and B-Zone are comparable, Lupin is a world-class deposit having 20 times the ore reserves of B-Zone (Table 2-1) and a life expectancy of more than ten years. In the future, gold production from Lupin alone is expected to exceed the combined output of the Con and Giant mines.

Volcanic-Sedimentary Contact Deposit: Salmita

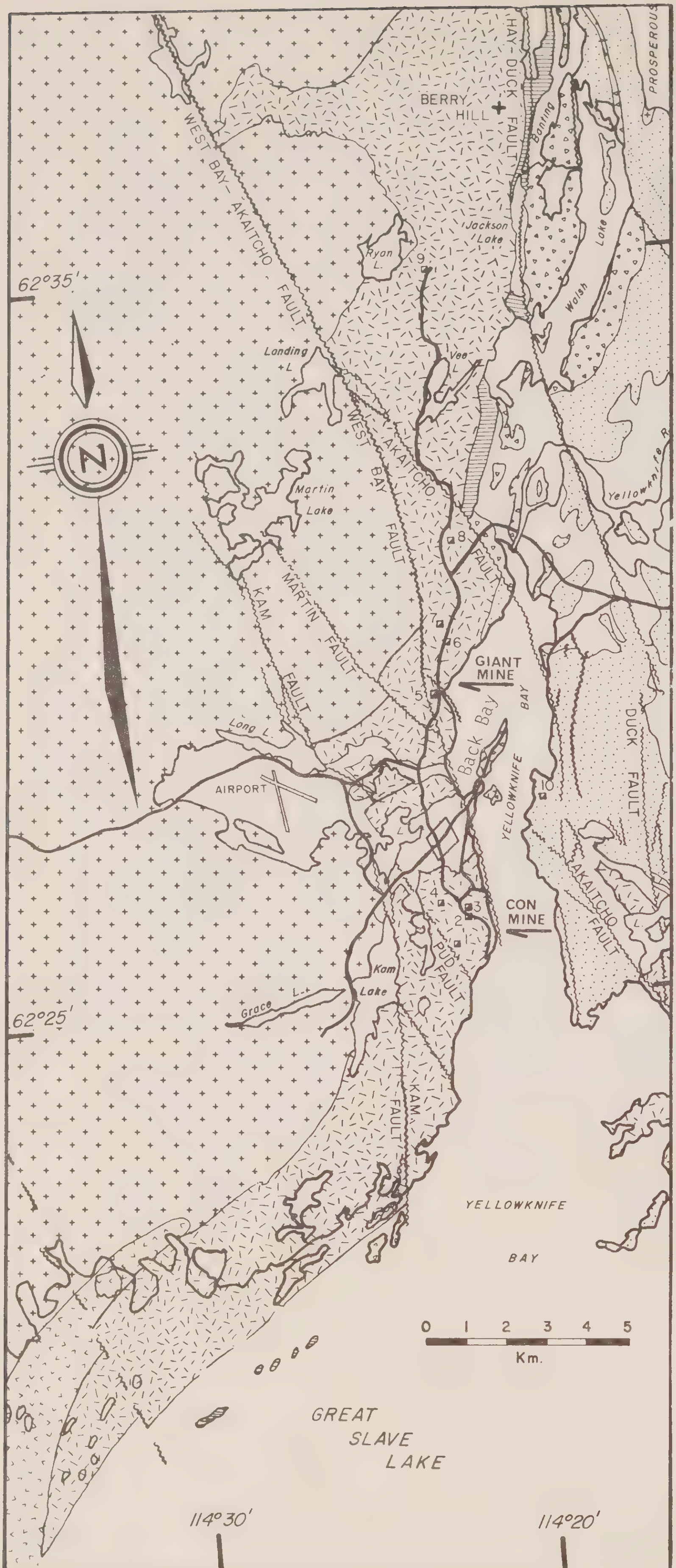
Salmita is a small but high-grade deposit situated on the east shore of Matthews Lake (Fig. 2-2). Gold is in a quartz vein bounded by footwall argillite and hangingwall basalt. Ransom (1983) speculates that the gold was deposited with siliceous sinter in a shallow basin during a hiatus in clastic volcanism when geothermal hot-spots were active. Two other former gold producers, the Discovery and Tundra Mines (Fig. 2-2), are in similar geological environments. The potential of such deposits is exemplified by Discovery, from which about one million tonnes of ore grading 34 g Au/t was mined.

CON MINE

Cominco Ltd.	Gold,Silver
P.O. Box 2000	85J/8
Yellowknife, NWT, X1A 2M1	Con shaft at:
	62°26'22"N,114°22'08"W

REFERENCES

Numerous references to the Con mine and environs can be found in papers by: Boyle (1961); Breakey (1977); Campbell (1947); Helmstaedt and others (1981); Henderson (1970, 1975, 1976, 1978); Henderson and Brown (1966); Kerrich (1981); Myers (1981); McMurdo (1979); Padgham (1975, 1981); Sproule (1952). Boyle's excellent paper is the most comprehensive of these, and discusses in detail the geology, geochemistry and origin of the gold deposits of the Yellowknife district.



GEOLOGY OF THE YELLOWKNIFE VOLCANIC BELT

SHOWING

PROTEROZOIC FAULTS and MINE SHAFTS

- Pleistocene and recent
- Granodiorite and related intrusives

YELLOWKNIFE SUPERGROUP

- Burwash and Walsh Formations: mudstone, greywacke, clastic flows
- Banting Formation: clastic flows and volcaniclastic sediments, some pillowed volcanic flows
- Jackson Lake Formation: conglomerate and sandstone
- Kam Formation: basalt
- Octopus Formation: basic tuff (?) greywacke, siltstone, agglomerate

MINE SHAFTS

1. Robertson	6. Giant C
2. Negus	7. Giant B
3. Rycon	8. Akaitcho
4. Con	9. Crestaurum
5. Giant A	10. Burwash

Geology after Jolliffe (1942, 1946), Henderson and Brown (1966), Henderson (1975), Helmstaedt (1981).

FIGURE 2-4: Geology of the Yellowknife Volcanic Belt showing Proterozoic faults and mine shafts (geology after Jolliffe, 1942, 1946; Henderson and Brown, 1966; Henderson, 1975; and Helmstaedt, 1981)

PROPERTY

CON 1-4; GG 1-14; MEG 1-10; MIDNIGHT 1; NEGUS 1-4; PIZ 1-2; P&G 1-4; 1 ROSE claim; SOL 1-4; STAR 1-2.

Cominco holds 60% interest in Rycon Mines Ltd's P&G group and full interest in all the other claims listed. Interests in Vol Mines Ltd (66.7%; N'KANA claims), Kamcon Mines Ltd (74%; KAM, KAMEX, and AYE claims) and Ptarmigan Mines Ltd (91.2%; JACK and LILY claims) give Cominco control of about 100 additional claims in the Yellowknife area. Cominco also has an option on fifteen claims (CAG, DAW and PRW claims) held by Yellorex Mines Ltd. All but the JACK and LILY claims, which are about 11 km northeast of Yellowknife, are shown in Figure 2-6.

LOCATION

The Con-controlled claims lie partly within Yellowknife's city limits. The mill is about 1.6 km south of the center of Yellowknife (Fig. 2-6).

HISTORY

The Con, Rycon and Negus mines developed as separate entities, but because they are now linked by underground workings and controlled by Cominco, they are most often referred to collectively as the Con mine.

CON 1-14 were staked for Cominco in 1935. The C-1 shaft was collared in 1937 to exploit the Con shear (Figs. 2-5, 2-6), and a 90-tpd mill, later increased to 320 tpd, was put into operation. The first gold bar was poured September 3, 1938.

P&G 1-4 (RYCON group) were staked by Tom Payne and George Latham in 1936. Cominco obtained controlling interest in the claims the following year and in 1938 incorporated Rycon Mines Ltd to explore and develop the Rycon Shear. The Rycon shaft (Fig. 2-6) was collared in 1938 and the first ore from the Rycon mine was received at the Con mill in 1939. The C-1 and Rycon shafts, about 950 m apart, are connected by crosscuts on the 500- and 950-foot levels (Fig. 2-5).

NEGUS 1-6 were staked by Ole Hagen and George Goodwin in 1936-37 and transferred to Negus Mines Ltd in 1938. The Negus shaft was collared to exploit the Negus Shear (Figs. 2-5, 2-6) and a 40 tpd mining operation began in 1939 and continued until ore was exhausted in 1952. During the last years of operation most of the Negus ore came from the Campbell Shear Zone, which will be discussed in greater detail later. Between 1939 and 1952, the Negus mine produced 7,956 kg of gold from 445,342 t of ore for an average

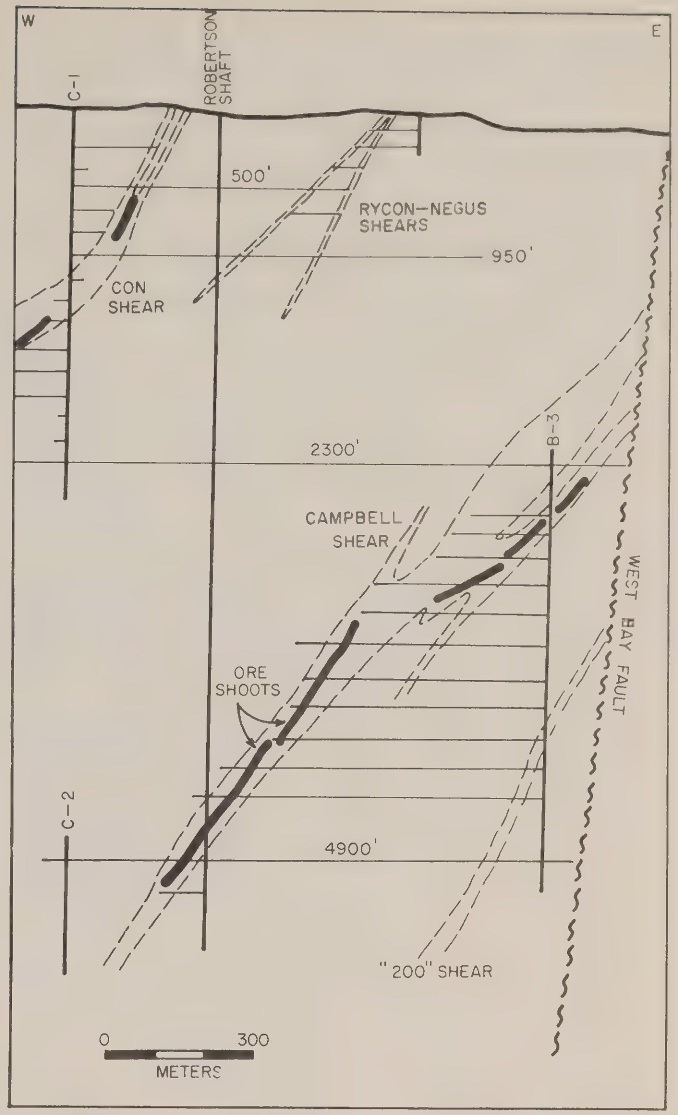


FIGURE 2-5: Schematic section showing shear zones and underground development, Con Mine (from McMurdo, 1976)

grade of 17.8 g/t (0.52 oz/ton). The NEGUS claims were purchased by Cominco in 1953 and the underground workings are now part of the Con mine ventilation system.

Cominco further consolidated its holdings in the area between 1936 and 1948 by acquiring the MEG, MIDNIGHT, PIZ, ROSE, SOL and STAR claims, which adjoin the core CON-PG-NEGUS claims. The GG claims were added in 1976.

Resource shortages during World War II caused mining at Con, Rycon and Negus to be suspended between 1943 and 1946, during which time development work was done by a small crew directed by geologist Neil Campbell. Using marker beds and dikes, Campbell established the offsets on the major Proterozoic faults and deduced that a major shear zone, an

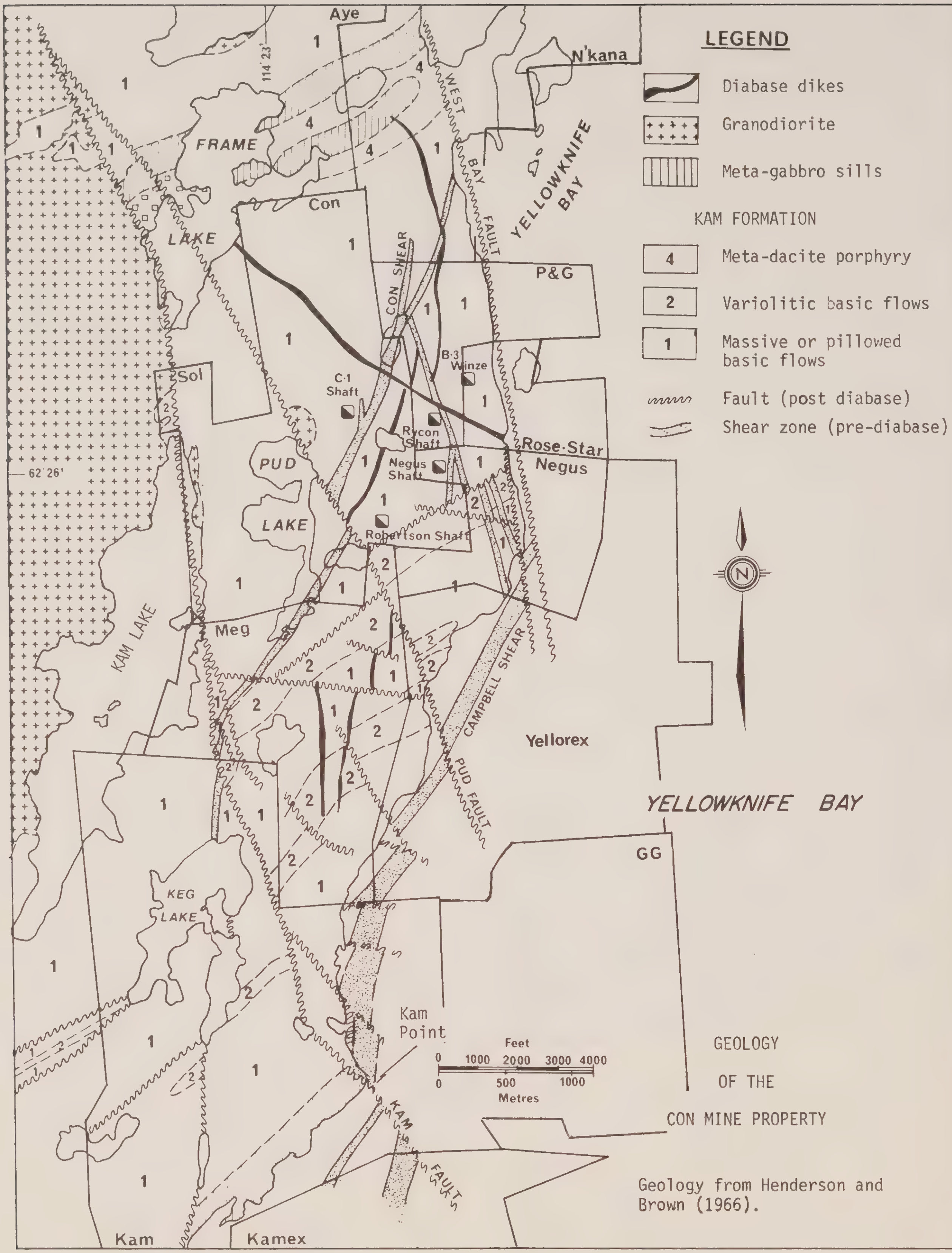


FIGURE 2-6: Geology of the Con Mine property

extension of the Giant Shear Zone offset along the West Bay Fault, might underlie the eastern CON-RYCON-NEGUS claims. His hypothesis was confirmed when a gold-bearing zone, later named the Campbell Shear, was intersected by deep drilling in 1944. The C-1 shaft was deepened, a crosscut was driven 1100 m easterly on the 2300-foot level, and in 1950 the B-3 winze (Figs. 2-4, 2-5) was collared to exploit the Campbell Shear Zone. By 1958, ore in the Con, Rycon and Negus shears was essentially exhausted, and since then the bulk of production has been from the Campbell Shear Zone.

In 1970 the Con mill, which had been treating refractory sulfide ore, was converted to treat the free-milling gold found in the deeper levels of the mine. In 1971 the C-2 winze (Fig. 2-6) was driven from the 4,900-foot level to the 5,600-foot level directly beneath the C-1 shaft to explore for new ore. In 1977, the 1655-m-deep Robertson Shaft was completed and the mill capacity was increased to 590 tpd.

From 1938 to 1983, the Con, Rycon and Negus Mines have produced 115,573 kg of gold from 5.96 Mt of ore for an average grade of 19.39 g Au/t.

DESCRIPTION

The Kam Formation forms a northeasterly striking, steeply southeast-dipping, homoclinal succession of principally mafic, massive to pillowed volcanic flows intruded by westerly dipping dikes and irregular bodies of gabbroic composition. To the west, these mafic rocks are intruded by plutons including the Western Granodiorite Batholith. The plutons, volcanics and mafic dikes are in turn cut by a series of northeasterly and northwesterly trending diabase dikes. The West Bay Fault and several other north- to north-northwest-trending Proterozoic faults displace all lithologies. The ore-bearing shear zones cut the volcanics and gabbroic dikes, but not the diabase dikes (Henderson and Brown, 1966). This fortunate circumstance of cross-cutting relationships was used to reconstruct the volcanic belt and to discover the Campbell Shear Zone (Campbell, 1947).

The Con Shear, which strikes about 020° and dips steeply west, is 3 to 75 m wide and has been traced for 8 km. The Rycon and Negus shears, which are splays from the Con Shear, trend more northerly and are not as wide on average or as long. The Campbell Shear Zone, which roughly parallels the Con Shear, is 60 to more than 300 m wide and has also been traced for 8 km.

Ore in the shear zones is in lenses and veins of white to dark-grey quartz. The ore bodies, typically 2 to 6 m wide and 90 m long, are localized in dilational zones: flexures in the shear systems, intersections of converging shears, and pressure shadows of undeformed volcanic horses that were rotated during shearing. Shear zones are altered to chlorite schist, and ore bodies are generally enveloped by a chlorite-carbonate-sericite alteration zone as thick as 2 m. Ore shoots tend to dip 2° to 4° more steeply, and schistosity 10° to 15° more steeply, than the shear zones. This, along with the dragfold geometry of quartz veins, is taken as evidence that the major schist zones are essentially thrust faults (Boyle, 1961).

Gold-bearing quartz usually contains pyrite, arsenopyrite, stibnite, chalcopyrite, pyrrhotite, sphalerite, galena, silver and a variety of sulphosalts and tellurides. Gold forms minute nuggets, films and plates in fractures, vugs or vein contacts and is also present in the sulphosalts and iron sulphides.

CURRENT WORK AND RESULTS

Development at Con from 1981 to 1983 is summarized in Table 2-5; production and reserves from 1976 to 1983 are shown in Table 2-6.

TABLE 2-5: DEVELOPMENT, CON MINE, 1981-1983

DEVP'T	1981	1982	1983
Lateral	2344m	2772m	2429m
Raising	389m	858m	572m
Underground drilling	13,652m	20,589m	23,187m
Surface drilling	9 holes 3592m	14 holes 4293m	small amount

Sources: Mining Inspection Service, Gov't of the NWT, and Con Mine personnel

TABLE 2-6: PRODUCTION AND RESERVES, CON MINE 1976-1983

	PRODUCTION		RESERVES	
Year	kt Mined	kg Au Recv'd	Mt Reserves	g Au/t
1976	136	2800	1.33	20.3
1977	142	2900	1.48	19.9
1978	192	3550	1.50	19.6
1979	197	2950	1.63	17.9
1980	192	3000	2.00	16.8
1981	176	2300	1.90	16.8
1982	212	2470	1.90	16.1
1983	190	2220	1.72	15.1

1982 Ore mined in 1982 was of a lower grade than that mined the previous year; 12.34 g Au/t compared to 14.1 g Au/t in 1981. However, gold output increased 6% to 2471 kg because of a 20% increase in mill throughput (Table 2-6). A 13-million dollar arsenic trioxide plant was completed in 1982. The plant will treat the arseniferous wastes that accumulated when roasting was required to recover gold and silver prior to 1970. Arsenic sludge is converted into purified arsenic trioxide, a granular compound that is used as a wood preservative. The residue is treated to extract gold and silver. It has been estimated that the wastes contain 23 kt of arsenic trioxide, 406 kg of gold and 977 kg of silver.

Underground diamond drilling in 1982 at levels 60 m below the present mine workings as well as in areas adjacent to workings was encouraging. Tonnages about equal to the ore mined in 1982 were added to reserves. Surface diamond drilling tested the down-rake extension of a gold-bearing zone on the MEG claims (Yellorex South) and investigated the grade and tonnage potential in a portion of the Campbell Shear Zone southwest of the Kam Fault (Kam Point South).

1983 Less ore was processed in 1983 because of a two-month strike at mid-year. Gold output declined from 2471 kg in 1982 to 2219 kg in 1983, but a 13% increase in the price of gold more than compensated for this reduced production.

Encouraging deep-drilling results prompted a decision to deepen the Robertson Shaft by 247 m to 1900 m. This 9-million dollar project, which will provide four more working levels, is scheduled to be completed in 1985.

Full production from the new arsenic recovery plant was delayed because of difficulties in reaching process and product specifications. The plant is expected to operate at design capacity in 1984.

Surface drilling in 1983 was limited to several shallow holes near Negus Point.

GIANT MINE

Giant Yellowknife Mines Ltd.	Gold,Silver
Yellowknife, N.W.T.	85J/8,9
	"C" shaft at:
	62°29'57"N,114°21'40"W

REFERENCES

Numerous references to the Giant mine and environs can be found in papers by: Boyle (1961); Helmstaedt and others (1981); Henderson (1970, 1975, 1976, 1978); Henderson and Brown (1966); Hodgson (1976); Kerrich (1981); Myers (1981); Padgham (1975, 1981). Boyle's excellent paper (GSC Memoir 310, 1961) is the most comprehensive of these and describes in detail the geology, geochemistry and origin of the gold deposits of the Yellowknife district.

PROPERTY

Giant group: GIANT 1-21, GIANT X1-X5, LAW 2-3.
Lolor group: 6 LOLOR claims
Supercrest group: AES 27 to 50, 1 FB(Fr) claim

Giant Yellowknife Mines Ltd has full ownership of the Giant group, 87.5% interest in Lolor Mines' Lolor group and 50.01% interest in Supercrest Mines Ltd's Supercrest group. Conwest Exploration Company Ltd has the remaining interest in the Lolor group and Akaitcho Yellowknife Mines Ltd in the Supercrest group. Giant Yellowknife also holds 58.5% interest in about 150 claims to the north (Lynx and Northbelt options). The remaining interest is divided between Falconbridge Nickel Mines Ltd (32.3%) and Transcontinental Resources Ltd (9.2%).

LOCATION

The main C shaft is about 5.0 km north of Yellowknife city centre.

HISTORY

The Giant, Lolor and Supercrest (Akaitcho) mines developed as separate entities, but because they are now connected by underground workings and controlled by Giant Yellowknife Mines Ltd they are referred to collectively as the Giant Mine.

GIANT 1-21 were staked for Burwash Yellowknife Mines Ltd in 1935. Giant Yellowknife Gold Mines was incorporated in 1937 to develop the property, but little was done until 1943 when Frobisher Explorations, a subsidiary of Ventures Ltd, signed an agreement to gain management control of the Giant group. That same year, Frobisher's consulting

geologist, Dr. A.S. Dodson, mapped the claims and deduced that ore might be found in the relatively unprospected ground underlying Baker Creek Valley. This hypothesis was confirmed in January of 1944 when the gold-bearing Giant Shear Zone was intersected by diamond drilling. The A, B and C shafts were collared, a 450 tpd mill was put into operation, and the first gold brick was poured in May, 1948. The mill capacity was increased by stages to 900 tpd in 1960, the year that Giant Yellowknife Gold Mines amalgamated with Consolidated Sudbury Basin Mines Ltd to form Giant Yellowknife Mines Ltd. With a 1962 Ventures Ltd merger, Giant Yellowknife became one of the Falconbridge Group of Companies.

In 1974, production started from the A-1 open pit (Fig. 2-7) after a feasibility study indicated that 435,000 t grading 10.3 g Au/t could be mined profitably. Other open pits, shown in Figure 2-7, soon came into production. Open pits now account for 27% to 40% of mill feed.

Today, the main C shaft extends to a depth of 644 m and services eleven levels. The A and B shafts extend to about 240 m and service five levels each. All shafts are connected by a 2300 m haulageway at the 750-foot level. Mill capacity is now 1100 tpd.

The Lolor group was staked in 1936 and acquired by Conwest Exploration Co Ltd in 1938. Lolor Mines Ltd was incorporated in 1953, five years after Giant Yellowknife Gold Mines acquired 87.5% interest in the claims. The Lolor mine began production in 1967, operating from an extension on Giant's 425-foot level. The Lolor Mine has supplied about 3.8% of the Giant operation's total mill feed.

The Supercrest group was staked in 1936 for Aerial Exploration Syndicate Ltd and acquired in 1938 by Frobisher Exploration Co Ltd. After drilling in 1944-45, Akaitcho Yellowknife Gold Mines Ltd was incorporated to develop the claims. By 1948, 17,200 m of drilling had been completed, four ore-shoots identified and the Akaitcho shaft collared. In 1964, Supercrest Mines Ltd, jointly owned by Akaitcho Yellowknife and Giant Yellowknife, was formed to bring the property to production. A drift to the Akaitcho ore zone was started from the 750-foot level of the Giant mine and had advanced to a point directly below the Akaitcho shaft by 1967, the year that production from Supercrest began. Today, the Supercrest mine is being developed from extensions on Giant's 425, 575, 750 and 1100-foot levels. A new extension begun in 1979 along the 1500-foot level was completed in 1981. The Supercrest Mine has supplied about 4.8% of the Giant operation's total mill feed.

From 1948 to 1983, the Giant operations have produced 175,278 kg of gold from about 10.7 Mt of ore for an average grade of 16.9 g/t gold.

DESCRIPTION

The geology of the mine area (Fig. 2-7) is similar to that previously described for the Con mine.

The Giant Shear Zone is a northerly trending, generally west-dipping, subparallel, interlacing and splaying network of shears enclosing zones of chlorite-carbonate-sericite schist up to 762 m long and 137 m wide. Within these altered zones, gold-bearing quartz veins and lenses up to 15 m wide are localized in dilational zones: flexures in the shear system, intersections of converging shears and pressure shadows of undeformed "horses" that were rotated during shearing (Boyle, 1961). The Giant Shear Zone has been traced for about 5 km, and ore shoots to a depth of about 600 m. Ore zones tend to be longer in plan and shallower than those at Con. As the gold is generally associated with arsenopyrite, the ore is more refractory. Ore bodies contain about 7% metallic minerals; mainly pyrite, arsenopyrite, stibnite, sphalerite, chalcopyrite, galena and sulfosalts.

CURRENT WORK AND RESULTS

Development at Giant from 1981 to 1983 is summarized in Table 2-7; production and reserves from 1976 to 1983 are shown in Table 2-8. As a result of a study completed in 1982 to establish an optimum mining rate for improved extraction, the rate was decreased from 30 kt per month in 1982 to 24.7 kt per month in 1983. Another study in 1982 to determine whether effluents contained dissolved gold resulted in the design and installation of a carbon column recovery unit in 1983 that will be fully operational in 1984. Significant capital expenditures in 1982 included $342,000 to construct a new tailings dam and $169,000 to complete a new effluent treatment plant.

During 1982, 1.36 kt of arsenic trioxide were shipped compared to 1.09 kt the previous year. Test work was continued to determine the feasibility of recovering arsenic trioxide stored in underground workings. In 1983, 0.73 kt of arsenic trioxide were shipped, but prices received for the product decreased substantially.*

**This information, from Giant annual report, conflicts with Gov't NWT information (Table 3) who report increased value for As_2O_3 in 1983*

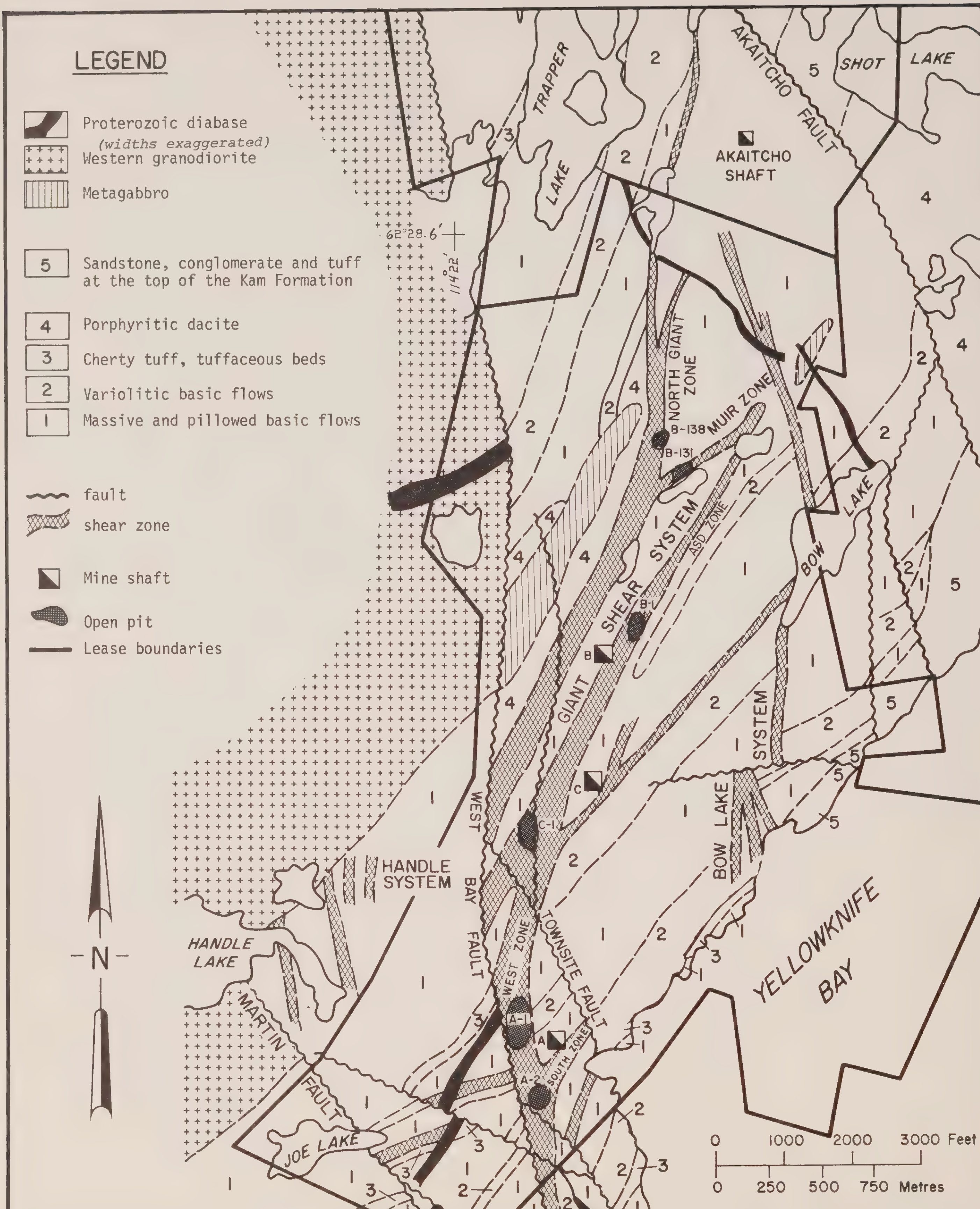


FIGURE 2-7: Geology of the Giant Mine property (from Henderson and Brown, 1966)

Gold recovery increased from 83.4% in 1981 to 85% in 1982 and 1983. However, operations in 1983 were adversely affected by failures of the roaster in March and April because of high antimony levels in the ore.

TABLE 2-7: DEVELOPMENT, GIANT MINE, 1981-1983 (GIANT, LOLOR, AND SUPERCREST)

DEV'T	1981	1982	1983
Lateral	5154m	5132m	3428m
Raising	515m	796m	850m
*Drilling	25,079m	8708m	8533m

**mainly underground drilling*
Source: Giant Annual Reports, 1981-1983

TABLE 2-8: PRODUCTION AND RESERVES, GIANT MINE (GIANT, LOLOR and SUPERCREST) 1976-1983

	PRODUCTION		RESERVES	
Year	kt Mined	kg Au Recv'd	Mt Reserves	g Au/t
1976	390	3350	1.36	11.7
1977	405	3300	0.80	11.7
1978	360	2950	1.20	9.3
1979	380	2350	1.85	7.2
1980	205	1190	1.80	7.2
1981	360	1825	1.10	8.2
1982	366	2260	0.90	8.2
1983	297	1960	1.00	7.9

Giant Mine

A three year summary (1981-1983) of production and related data from the Giant Mine is given in Table 2-9. Mining of richer ore zones, better grade-control and increased mill throughput resulted in improved gold output in 1982. Although higher-grade ore was mined in 1983, gold output declined with initiation of the planned cutback in underground mining. Diamond drilling in 1982 was confined to producing areas of the mine. In 1983, a decline was driven towards the DCW Zone near the A shaft; a zone that has reserves of 29.5 kt grading 10.63 g Au/t and is scheduled to begin production in July of 1984.

Another zone, the UBC Zone near the B Shaft, will be developed by a decline early in 1984. Diamond drilling has indicated reserves of 16.3 kt grading 19.2 g Au/t in this narrow vein, which has additional potential both along strike and down dip. Considerable work was done in 1983 to divert Baker Creek for access to an extension of a pit near the C Shaft. The extension zone is estimated to have ore reserves of 71.7 kt grading 8.57 g Au/t.

TABLE 2-9: GIANT MINE: PRODUCTION, RESERVES, OPERATING COSTS AND OPEN-PIT MILL FEED, 1981-1983

Year	1981	1982	1983
kg Au Output	1769	2213	1923
kt Mined	350	359	294
Grade g Au/t	6.07	7.23	7.68
Mt Reserves	1.06	0.86	0.99
Grade g Au/t	7.43	8.23	7.89
$ Cost/g Au	14.29	12.71	12.87
% from open pits	27	24.5	32.6

Source: Giant Mine Annual Reports, 1981-1983

Lolor Mine

A three-year summary (1981-1983) of production and related data from the Lolor Mine is given in Table 2-10. Development work was minor and there was no diamond drilling done in 1982 or 1983.

TABLE 2-10: LOLOR MINE: PRODUCTION, RESERVES AND OPERATING COSTS; 1981-1983

Year	1981	1982	1983
kg Au Output	36.1	44.4	20.9
kt Mined	5.23	6.77	2.81
Grade g Au/t	8.74	7.41	10.9
kt Reserves	14.5	7.26	5.44
Grade g Au/t	8.23	7.20	8.23
$ Cost/g Au	10.48	11.40	12.33

Source: Giant Mine Annual Reports, 1981-1983

Supercrest Mine

Supercrest was not mined during 1982 or 1983. The grade of ore was recalculated to a slightly lower figure (Table 2-11). Ore-definition diamond drilling from the 1500-foot level was completed.

TABLE 2-11: SUPERCREST MINE: PRODUCTION, RESERVES AND OPERATING COSTS; 1981-1983

Year	1981	1982	1983
kg Au Output	19.6	not mined in 82-83	
kt Mined	3.54		
Grade g Au/t	6.89		
kt Reserves	24.5	24.5	24.5
Grade g Au/t	12.7	11.7	11.7
$ Cost/g Au	36.98	not mined in 82-83	

Source: Giant Mine Annual Reports, 1981-1983

SALMITA MINE

Giant Yellowknife Mines Ltd. — Gold, Silver
Yellowknife, NWT — 76 D/3
XOE OHO — $64^{o}4.5'N, 111^{o}14.5'W$

REFERENCES

Dillon-Leitch (1981, 1984); Folinsbee and Moore (1950); Henderson (1944); Lord (1951); Moore (1951, 1956); Ransom (1983).

PROPERTY

Lease numbers 3040 to 3070 covering 561 ha and comprising the following claims: LT 1-3, LUFF 1-4, SALERNO 1-18 and TOUGH 1-6. Giant has also acquired the properties of Tundra Gold Mines Ltd. to the south. These properties are encompassed in Lease 3104 covering 857 ha and comprising the following claims: JEJA 1-6, MAD 1-18 and REP 1-12. Unleased claims contiguous with the above properties include GIANT 1 and WIN 1-18.

LOCATION

Salmita is on the east shore of Matthews Lake, 240 km north-northeast of Yellowknife. A 1350-m-long gravel airstrip lies about 5 km by gravel road from the mine. An ice road to Yellowknife is operational during January and February.

HISTORY

Regional mapping at a 1:253,440 scale by Henderson (1944) was followed by detailed mapping of part of the Matthews Lake area (NTS 76 D/3) at a 1:24,000 scale by Moore (1956). Other geological reports on the Matthews Lake area include Moore (1951) and Folinsbee and Moore (1950). Ransom (1983) summarized the history and presented a geological update of the Salmita Mine, and Dillon-Leitch (1981) studied the volcanic stratigraphy, structure and metamorphism in the Courageous Lake-MacKay Lake Volcanic Belt. The following historical information is mainly from Ransom (1983).

The first of several gold showings in the Matthews Lake area was found in 1939. The SALERNO, LT, LUFF and TUFF claims were staked between 1945 and 1951. Salmita Northwest Mines Ltd. was formed to develop these properties and considerable trenching, diamond drilling and geological mapping were carried out. In 1952, a 44-m vertical shaft was sunk into one vein (B Vein) and 20 m of drifting was done. Ore grade was estimated at 27 g Au/t over 1.68 m. No further work was done until the properties were acquired by Bluebell Enterprises Ltd. between 1970 and 1973 and optioned to Giant Yellowknife Mines Ltd. in 1974.

In 1975, 20 drill holes totalling 2687 m probed the B Vein and a 320-m development decline was completed. Airborne VLF-EM and magnetometer surveys by Kenting outlined a number of parallel conductors, one of which lay along strike and to the south of the B Vein. Drilling in 1976 confirmed that this conductor is caused by a narrow massive sulphide zone within altered turbidites near a zone of graphitic fault gouge.

No further work was done until 1981 when a feasibility study recommended extensive underground development to substantiate grades and tonnages.

DESCRIPTION

The northerly trending Courageous Lake-MacKay Lake Volcanic Belt (Fig. 2-8) is a steeply east-dipping, 65-km-long, 1- to 5-km-thick succession of Archean mafic flows including subordinate mafic agglomerate, mafic breccia, intermediate lava, quartz-feldspar porphyry, phyllite and mica schist. There are two cycles of felsic lava within this predominantly mafic succession; Cycle 1 near the base and Cycle 2 at the top (Fig. 2-8). Cycle 1 felsic lavas attain a maximum thickness of 60 m and host massive, stringer and disseminated sulfides containing copper, zinc and silver. Cycle 2 felsic lavas are up to 1800 m thick and are associated with many of the gold-bearing quartz veins in the region. The volcanic succession is flanked (overlain) to the east by turbidites comprising greywacke, slate and minor conglomerate and chert. These supracrustal rocks, part of the Yellowknife Supergroup, are intruded by various granitic rocks (granodiorite, tonalite, trondjhemite and granite), some of which may be older than the Yellowknife Supergroup (Dillon-Leitch, 1981). The granitic rocks crop out mainly to the west of the volcanic belt (Fig. 2-8). Proterozoic diabase dikes of the Mackenzie Dike Swarm are the youngest rocks in the area.

The supracrustal rocks have undergone three stages of metamorphism: 1) regional metamorphism of greenschist-facies grade; 2) thermal metamorphism of low to high amphibolite-facies grade associated with granitic intrusions and 3) late, hydrothermal, retrograde metamorphism. Although the volcanic rocks form a simple, east-facing homocline, the sedimentary rocks were folded and cleaved during three major

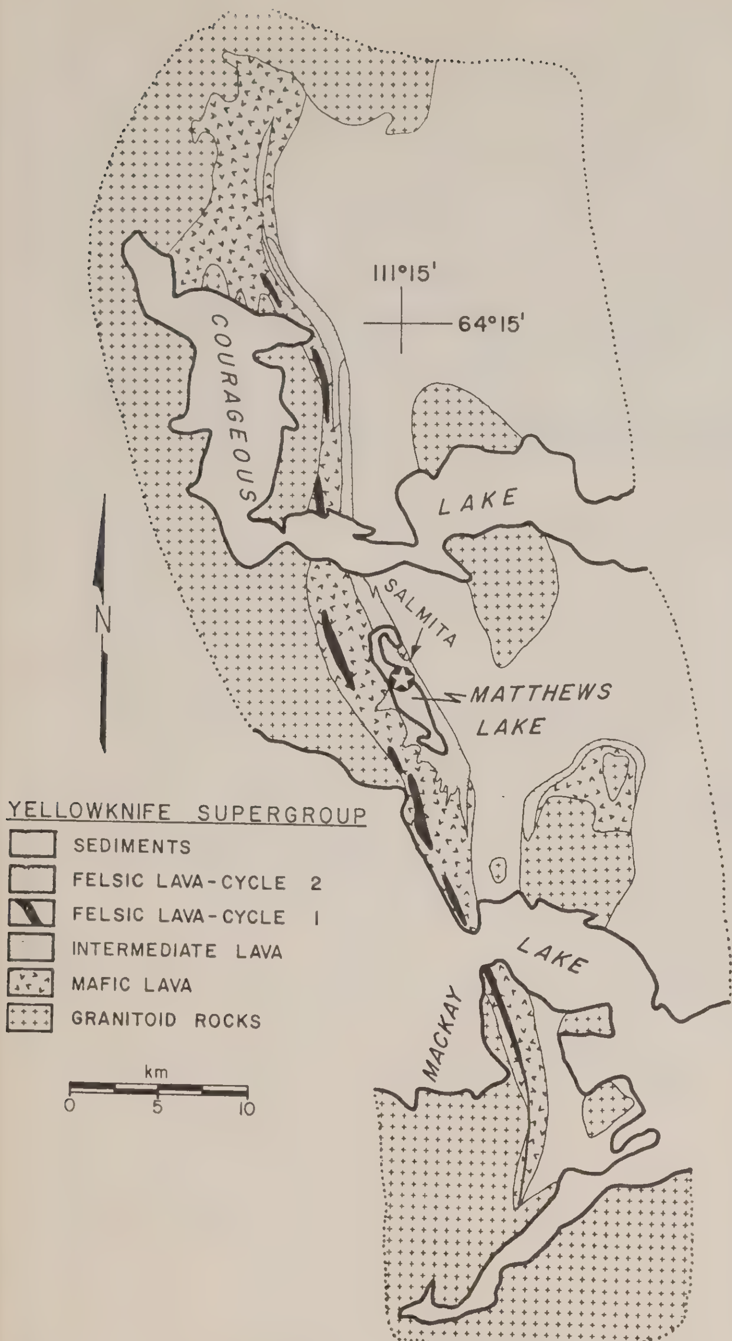


FIGURE 2-8: Generalized geology of the Courageous Lake-MacKay Lake volcanic belt (from Dillon-Leitch, 1981)

phases of deformation (Dillon-Leitch, 1981).

The B Vein at Salmita is one of many gold-bearing quartz veins at or near the contact between the volcanic and sedimentary rocks of the Yellowknife Supergroup. Ransom shows 15 gold showings along a 35-km segment of the contact; 8 on the volcanic side, 4 on the sedimentary side and 3 at the contact (Fig. 2 of Ransom, 1983). Only two of the showings, both within sediments, are more than half a kilometer from the contact, suggesting that it is an important structure controlling the localization of deposits (Moore, 1956). Furthermore, many of the deposits appear to be spatially associated with the felsic lavas of Cycle 2 (Fig. 2-8). For a detailed description of some of the gold-bearing veins in this area, refer to Lord (1951) and Moore (1956).

The B Vein lies within the Cycle-2 felsic domain to the west of the main contact discussed above, but on a detailed scale (Fig. 2-9) is seen to lie at a volcanic-sedimentary contact between footwall argillite to the west and hangingwall basalt to the east. The B Vein dips 80° to 85° east, is 150 m long, 1.5 to 2.5 m wide and is divided into three steeply south-plunging ore shoots separated by the Salmita Shear Zone in the south and a waste zone carrying minor gold in the north (Fig. 2-9). Free-milling gold in the quartz vein is associated with minor scheelite, arsenopyrite, pyrite, pyrrhotite, galena and sphalerite. Native gold is mainly within gangue adjacent to arsenopyrite, although a few grains are enclosed in arsenopyrite and rarely within pyrrhotite. The gold is commonly 2 to 12 micrometers in size, although nugget-size patches of free gold occur rarely. The wall rocks close to the vein are intensely silicified, carbonatized and sulfidized. Minor alteration products include tourmaline, chlorite and sericite.

A highly speculative, six stage genetic model for the emplacement and mineralizing history of the area was proposed by Ransom (1983) and is reproduced below.

STAGE	MINERALIZATION PERIOD	REMARKS
One	One	Massive outpourings of basalt along a major rift (?). Minor periods of felsic ejecta with associated massive sulfide development in structurally favourable loci (Cycle-1 volcanics of Fig. 2-8).
Two		Development of local calc-alkali centres that produce quartz porphyry stocks and release large volumes of rhyodacite flows, contemporaneously with continuous basaltic flows laterally, especially to the south.
Three	Two	Quiescence in extrusive activity.

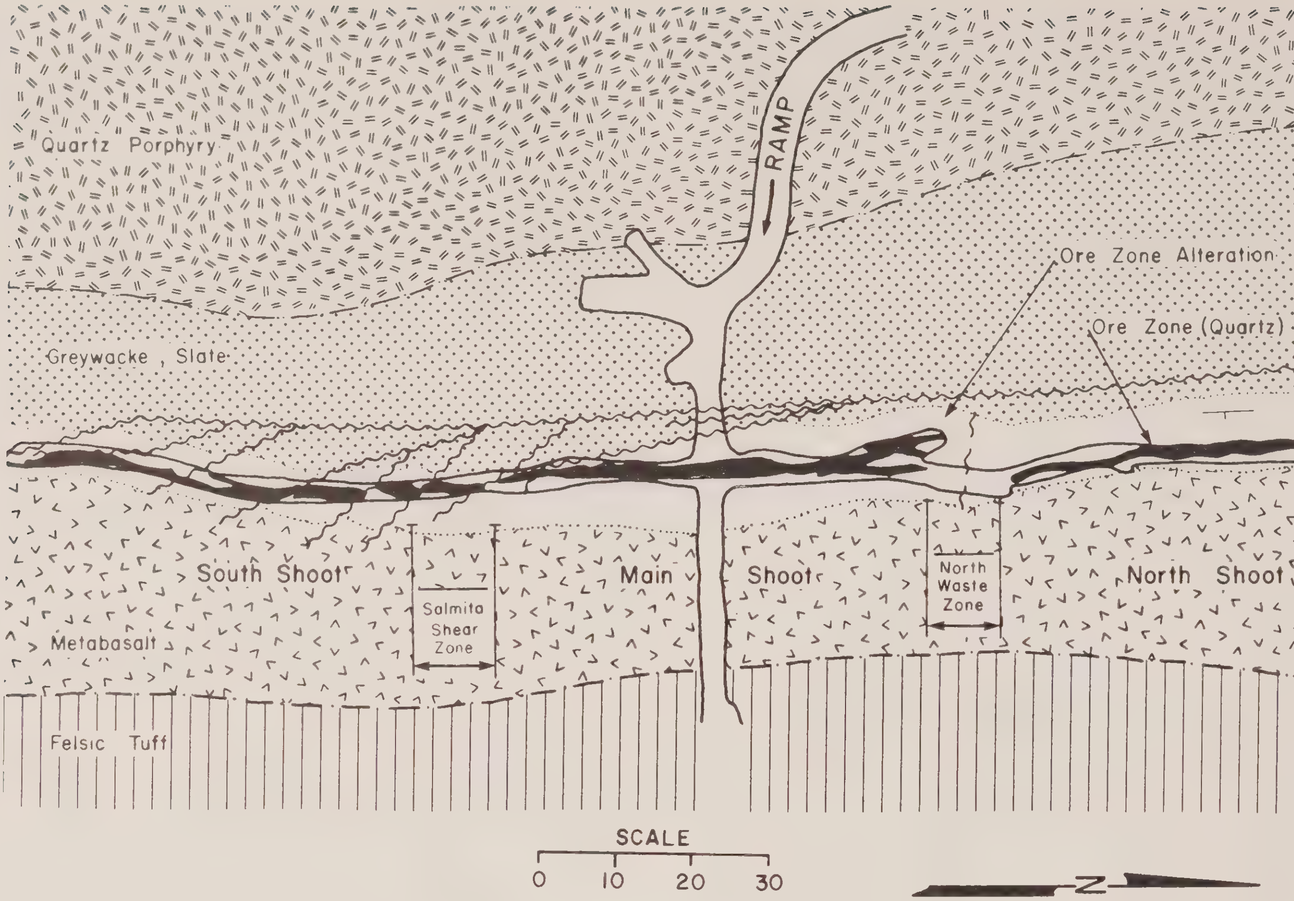


FIGURE 2-9: Geology at the 95-m level, Salmita Mine (from Ransom, 1983)

STAGE	MINERAL-IZATION PERIOD	REMARKS
		Small "lagoonal" facies black shale development in shallow basin(s). Geothermal hot spots are active with development of siliceous sinter (with gold, i.e., B-Vein) and barren, sulfide-facies iron-formation. Continues into Stage 4.
Four	Three	a) Local basaltic flows fill shallow basins and cap siliceous sinters. b) Sinters continue and/or new centres develop higher up the pile during or immediately after felsic tuff deposition.
Five	Four	Turbidite sedimentation with penecontemporaneous-to-post - deformation (?), "Last-gasp" silica flow into weak, well-capped structures and shear zones.
Six		Faulting, intrusion of diabase and gabbro, rotation.

CURRENT WORK AND RESULTS

Exploration to substantiate grades and tonnages was completed in July of 1982 and included driving a new 1060-m footwall ramp (13% decline) to the 95-m level and two drifts in ore on the 50-m and 95-m levels. These drifts tested strike lengths of 102 m and 180 m respectively. Eighteen diamond drill holes totalling 2076 m tested the B Vein and confirmed continuity of ore to the 200-m level. Early in 1983, recalculation of mineable ore reserves to 140 kt grading 27 g Au/t justified a production decision. The properties and assets of Tundra Gold

Mines Ltd. were purchased and the old Tundra mill, 5.3 km south of the Salmita mine site, was rehabilitated. Mining began on July 14, 1983. The mill was running by August 4 and the first bullion was poured on September 19. The decline was advanced 832 m to the 4th (205-m) level and mining was in progress on three levels by year-end. In 1983, 11.9 kt of ore grading 15.6 g/t Au were processed, although three times this amount was mined. Recoveries averaged 85.3% for a bullion output of 159 kg Au. Most of the ore treated in 1983 was from low-grade development headings.

LUPIN MINE

Echo Bay Mines Ltd.	Gold,Silver
#500, 10909 Jasper Ave.	76 E/14
Edmonton, Alta., T5J 3L9	$65^{\circ}46'N,111^{\circ}13.5'W$

REFERENCES

Bostock (1977, 1980); Covello (1983); Fraser (1964); Gibbins (1981); Kerswill and others (1983); Tremblay (1966, 1967, 1976).

PROPERTY

Lease #2428 covering 2,832 ha and comprising the following claims: CONGO 1-9, 111 MOP claims, PAT 1-3.

LOCATION

The Lupin Mine is on the west shore of northern Contwoyto Lake, 402 km north-northeast of Yellowknife. A 1,525-m-long gravel airstrip is adjacent to the mine and a winter road connecting to Yellowknife is operational between February and April.

HISTORY

Bostock (1980) mapped the regional bedrock geology of the Itchen Lake area (NTS 76 E (W 1/2) and 86 H (E 3/4)) at a 1:250,000 scale and also reported on the composition of iron-formation in the area (Bostock, 1977). Tremblay (1976) mapped the bedrock geology of the Contwoyto Lake area (NTS 76 E/11,14) at a 1:50,000 scale and also summarized the results of his earlier investigations (Tremblay; 1966, 1967). Gibbins (1981) and Kerswill and others (1983) summarized the geology of the mine area, and Covello (1983) summarized exploration strategies for finding iron-formation-hosted gold deposits in the Contwoyto area.

The following historical information is mainly from Echo Bay Mines Limited's annual reports for 1980 and 1981. The main showing was discovered by a Canadian Nickel Company Limited (Canico) reconnaissance crew in 1960. Exploration from 1961 to 1964 included mapping, trenching, geophysical surveying and 11,870 m of diamond drilling that outlined about 1.2 Mt of ore grading 17.14 g Au/t. The property was optioned by Echo Bay Mines Limited in February of 1979 and purchased in November of 1980 subject to royalty payments. During 1979 and 1980, Echo Bay reviewed earlier work and conducted underground exploration by driving a spiral ramp 664 m to a vertical depth of 137 m. Seventy-seven holes totalling 7,040 m were drilled from the ramp; all but two intersected gold. Drilling was planned so that ore reserves could be calculated to a depth of 198 m below surface, but one hole was drilled deep and intersected 9.6 m (true width) grading 19.9 g Au/t at a depth of 468 m. In February of 1981, a first public issue of Echo Bay Mines securities was sold to finance development and bring the Lupin Mine to production. Surface facilities, constructed mainly during 1981, included a powerplant, a 9,300-sq-m mill and recovery plant complex, tailings dams, a tailings line and a residential complex that can accommodate 240. About 3,000 m of drifting were done and more than 127 kt of ore grading about 10.3 g Au/t were stockpiled. Construction of a three-compartment vertical shaft to a planned depth of 366 m was well advanced by year-end. In September of 1981, proven and probable ore reserves above the 198-m level were estimated at 2.19 Mt grading 12.0 g Au/t.

DESCRIPTION

The Lupin Mine region is underlain by turbidites of the Yellowknife Supergroup that have been intruded by various Archean granitic rocks as well as by Proterozoic diabase dikes (Bostock, 1980; Tremblay, 1976). The turbidites, mainly greywacke, mudstone or metamorphic equivalents, have been subdivided by Bostock (1980) into the Itchen Formation and the Contwoyto Formation (Fig. 2-10). The Contwoyto Formation is defined by the essential presence of scattered bands and lenses of silicate, sulfide or oxide-rich iron-formation. The Itchen Formation is an extensive unit of turbidites similar to the Contwoyto Formation, but lacking iron-formation. The Lupin area is underlain by complexly folded Contwoyto Formation turbidites that have been metamorphosed under conditions of the upper greenschist facies. The

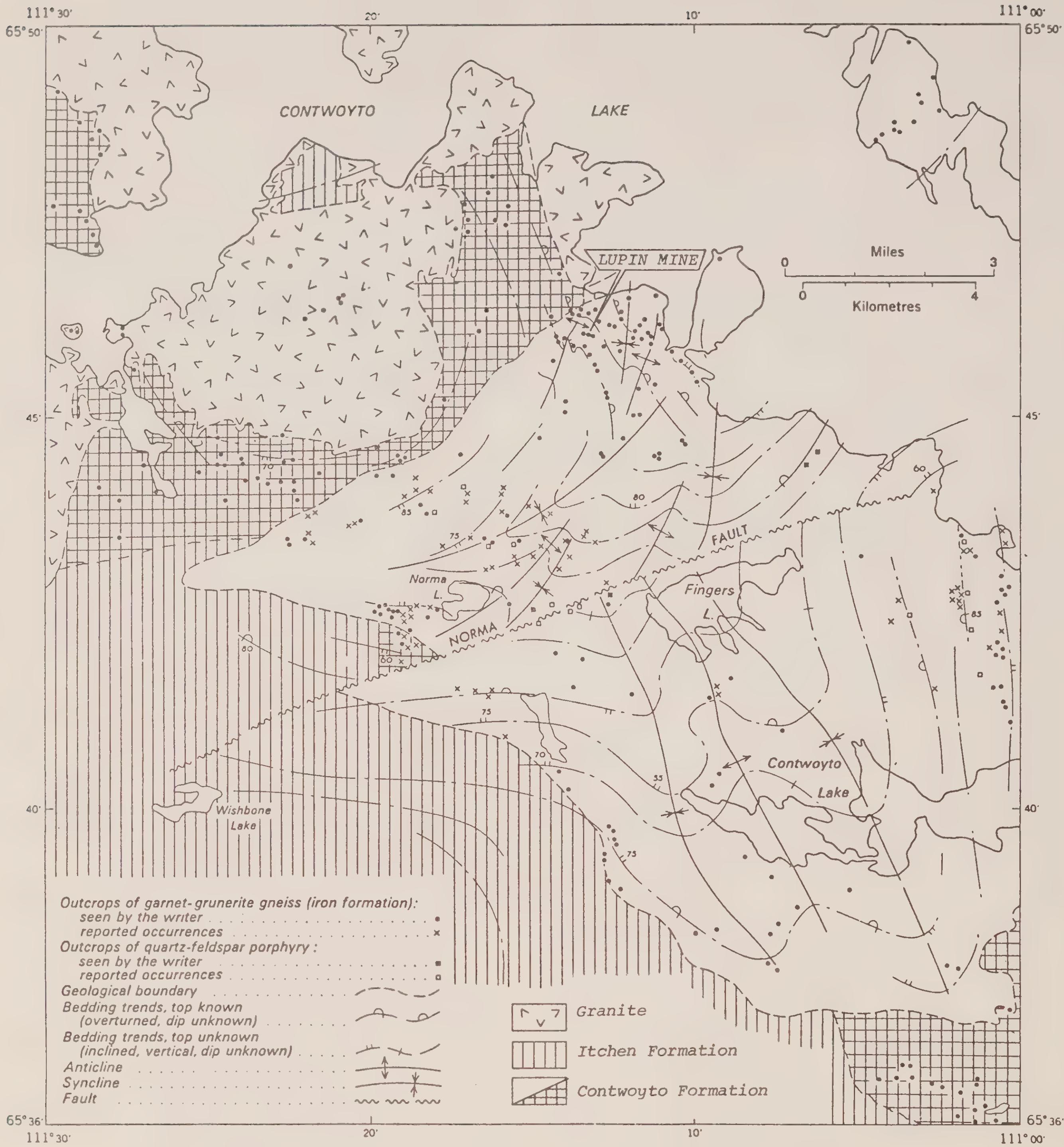


FIGURE 2- 10 General geology of the Lupin Mine area. Contwoyto Formation argillite and greywacke metamorphosed to greenschist facies are shown in white; amphibolite-grade facies are cross-hatched. The Itchen Formation in the map area is metamorphosed to amphibolite facies and is distinguished from the Contwoyto Formation by the absence of iron-formation lenses. (modified from Tremblay, 1976)

transition to amphibolite-grade facies is about one kilometer to the west of the mine (Fig. 2-10).

The gold at Lupin is in a Z-shaped, steeply north-plunging, stratabound silicate and sulfide-facies iron formation unit that has been tightly to isoclinally folded into a syncline-anticline pair. Most of the gold is in the west and east limbs of the syncline; the Centre Zone and East Zone respectively (Fig. 2-11). Additional ore is found in the west limb of the anticline (West Zone). The 5-m to 25-m-wide Centre Zone and the 0.5-m to 7-m-wide West Zone strike northerly whereas the East Zone, which is 3 m to 12 m wide, strikes northeasterly. All zones are steeply dipping, about 270 m to 300 m long, and persist at least to the 330-m level, although the East and Centre Zones are narrower at this depth than at surface.

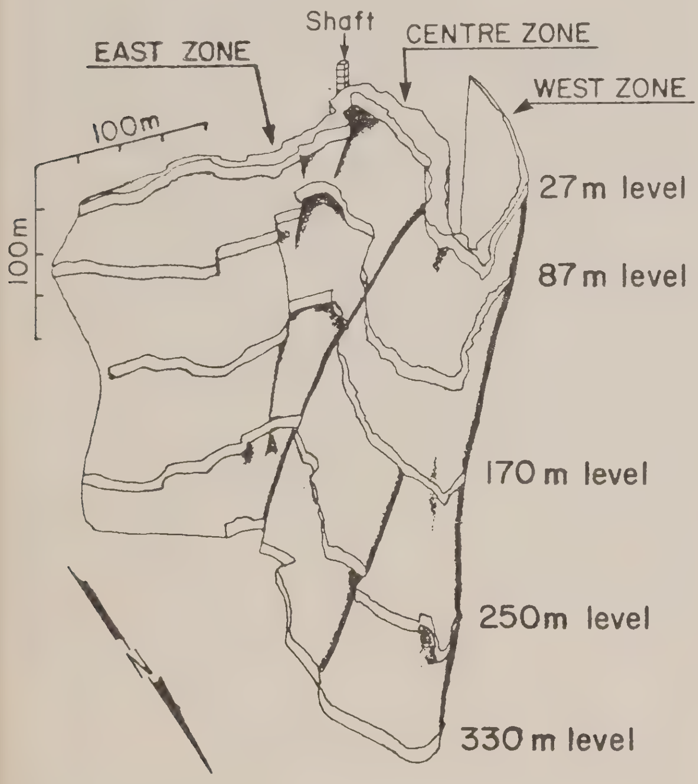


FIGURE 2-11: Isometric view of the Lupin orebody from the 27-m to the 330-m level (from Echo Bay Mines Ltd. annual report, 1982)

The silicate and sulfide-facies iron-formation consists primarily of amphibole (mainly grunerite), quartz and opaques (mainly sulfides). Silicate-facies iron-formation may have poikilitic almandine garnet as an important constituent, whereas sulfide-facies iron-formation is dominated by pyrrhotite. Arsenopyrite and loellingite are important components over restricted areas. Lenses and beds of pure quartz, likely derived through recrystallization of chert, make up a small proportion of the rock. Conformable, typically thin zones of chlorite schist and abundant, relatively late, discordant quartz veins also occur within the ore zones (Kerswill and others, 1983). In contrast to the B-Zone deposit, which is described in the next section, neither carbonate-facies nor oxide-facies iron-formation has been recognized at Lupin. Although regionally there are volcanic rocks that underlie the turbidite succession hosting the Lupin orebody, no clastic volcanics have been identified in the immediate vicinity of the mine.

The modes of occurrence of gold at Lupin have been described by Kerswill and others (1983).

> Gold at Lupin occurs as the native metal (Ag content about 14%) and is principally confined to sulphide-facies iron-formation. Two types of gold-bearing rock can be recognized. These are, 1) a widely and relatively uniformly distributed, arsenic-poor type containing abundant finely banded pyrrhotite but virtually no arsenic-bearing minerals, and 2) a more localized arsenic-rich type containing significant arsenopyrite (FeAsS) and loellingite ($FeAs_2$) that is clearly restricted to portions of the ore unit adjacent to late quartz veins and shear zones. The arsenides are typically intergrown with pyrrhotite in complex clots or porphyroblasts which decrease markedly in abundance and diameter as distance from the quartz veins and shear zones increases.
>
> Much of the gold in the arsenic-poor ore is reasonably uniformly disseminated as relatively large grains (50 microns) adjacent to pyrrhotite, but can also occur interstitially to silicates without close association with pyrrhotite. In the arsenic-rich ore gold is generally fine grained (20 microns or less) and is most abundant along arsenopyrite-loellingite grain boundaries. Some gold occurs as inclusions in the arsenides, and lesser amounts have been noted in quartz-rich inclusions and along micro-fractures in the arsenides. A modest amount of gold occurs as visible grains in the late quartz veins.

Bostock's statement that "gold (in the Itchen Lake area), so far as is known, is concentrated in the arsenic-bearing regions of the silicate-sulphide iron-formation facies" (Bostock, 1980) should be

reconsidered in view of the above.

Gibbins (1981) and Kerswill and others (1983) consider that most of the features in the Lupin orebody are consistent with chemical sedimentation and syngenetic concentration of gold, silver, iron, sulfur and silica from hydrothermal fluids during deposition of the Lupin ore unit.

> Such features include the stratiform, laterally extensive, and relatively uniform grade distribution of the well-banded pyrrhotite-rich, but arsenic-poor ore, as well as the apparent lack of structural control and alteration associated with this ore type. Other features such as the restricted distribution of arsenic-rich ore, the presence of narrow chlorite-rich alteration zones adjacent to some quartz veins and the occurrence of vein-hosted gold indicate a significant epigenetic component related to formation of the quartz veins. Arsenic, silica and possibly some gold were introduced during this event, which probably accompanied the latest phase of a long-lived continuously evolving metamorphic and deformational regime. A multistage hypothesis best explains the varied styles of gold mineralization at Lupin. However, gold distribution was more closely controlled by lithology and sedimentary processes than by structure or metamorphism. (Kerswill and others, 1983).

Tremblay (1980), however, believes that the iron-formation at Contwoyto Lake is clastic in origin. He points out the following differences between the Contwoyto iron-formation and that of a deposit to which Lupin is often compared, the Homestake Mine of South Dakata. 1) Homestake is hosted in chemical sediments 2) Homestake has less iron and more combined magnesia and lime 3) Homestake mine-rocks exhibit a wide zone of hydrothermal alteration with abundant sulfides and quartz veins and stringers and widespread chloritization 4) Metamorphism at Homestake is less intense.

Exploration

Covello (1983) summarized exploration strategies for finding iron-formation-hosted gold in the Contwoyto Lake area. His recent exploration efforts on behalf of a consortium of Calgary and Vancouver-based companies were focused on the low-grade side of the greenschist-amphibolite metamorphic isograd. Techniques included reconnaissance and detailed geological mapping; geophysical surveying (Fraser-filtered VLF-EM, total field magnetometer, magnetic gradiometer and SP) and diamond drilling. His conclusions were as follows:

1) Anomalous concentrations of gold are found in silicate-sulphide iron-formation. Gold concentration appears to be bimodally distributed; most of the iron-formation contains from 0.1 to 0.3 g/t gold, some of the iron-formation contains from 1 to 15 g/t gold. The higher concentrations are associated with massive to disseminated sulfides, mainly pyrrhotite, but also arsenopyrite and minor pyrite.

2) Magnetic surveying, both total field and gradiometer, appears to be the best way to detect iron-formation, although anomalies caused by diabase dikes must be discriminated from those caused by iron-formation. The zero-gamma-per-meter gradiometer contour corresponded to a diabase dyke in one survey, and this might be useful empirically to discriminate between diabase dykes and iron-formation.

3) Fraser-filtered VLF surveying did not outline an iron-formation in one area, but gave a weak anomaly over an iron-formation in another area. A strong VLF conductor (without a coinciding magnetic anomaly) found in one area was caused by graphite.

4) S.P. surveys yielded moderate negative anomalies over iron-formation.

5) At one locale where metamorphic grade is probably lower than normal for this region, tuffaceous wacke was recognized as the hangingwall to the iron-formation. This is a departure from the Lupin model inasmuch as volcanics have not been recognized at Lupin. This iron-formation is also mineralogically unusual; comprising chlorite + amphibole + serpentine + pyrrhotite + pyrite + arsenopyrite. Garnets were not observed.

CURRENT WORK AND RESULTS

1982

Construction of all surface facilities was completed by March, and the 366-m-deep, three-compartment vertical shaft was completed by October. The mill and recovery plant were commissioned in April and the first gold bullion was poured on May 4th. Millfeed was initially supplied from stockpiled development ore. Commercial production at the 862 tpd

mill was attained on October 1st; total cost of the project was $135 million. During 1982, about 200 kt of ore were milled and about 1,600 kg of gold recovered. Successful operations prompted a decision to expand the mill capacity to 1,034 tpd.

A major underground exploration and development program was begun in May to determine ore reserves between the 198-m and 390-m levels. When completed, total proven and probable reserves at Lupin were increased to 3.13 Mt of ore grading 13.58 g Au/t. Underground development in 1982 also included drifting on three future production levels at 170, 250 and 330 meters.

1983

Gold output was 3,670 kg from 323 kt of ore grading 12.0 g Au/t. The gold recovery rate, 94.3%, was slightly higher than anticipated. The project to increase the mill capacity by 20% from 862 tpd to 1,034 tpd was completed by the end of October, two months ahead of schedule, at a cost of $5.4 million. The average mill throughput in 1983 was 885 tpd. Mechanical problems with the surface crushing plant reduced mill throughput by 10% during the third quarter, but mill expansion included installation of a new rod mill that reduced the load on the crushing equipment. Other capital programs completed by year-end, at a cost of $5 million, included erection of two unheated storage buildings, installation of a 1.6-million-litre fuel tank, construction of yard areas to store consumables, and construction of an underground maintenance facility on the 170-m level. A 531-km winter ice road to the mine from the Ingraham Trail near Yellowknife was completed in February. The company's net saving by trucking 750 loads of freight (instead of airlifting) was $4.1 million.

Mine development included drifting of production sub-levels at 20-m intervals and haulage levels at the 87-m and 170-m levels (Fig. 2-12). Initial development was done on the 250-m and 330-m levels in both the Centre Zone and East Zone. By year-end, the sub-levels in the Centre Zone had been developed to the 170-m level and the ramp had been extended to that depth. Production in 1983 was mainly from the Centre Zone above the 87-m level. Mining of the East Zone above the 87-m level began by year-end. With additional ore reserves added by exploration and development during 1982, ore reserves at year-end to a depth of 400 m remained essentially unchanged from those of the previous year; 3.08 Mt at 13.58 g Au/t. Development in 1983 included 14,570 m of underground drilling, 2,329 m of lateral development and 164 m of raising (INAC, Mines and Mineral Statistics, Jan. to Dec., 1983).

One million dollars was spent on surface exploration in 1983. About 30% of this was spent on surface diamond drilling to test for extensions of the Lupin orebody. Of 29 holes drilled, seven intersected ore-grade gold across mineable widths, sixteen cut low-grade gold across widths that were less than mineable, and six intersected barren rock. Geological mapping and geophysical surveying were also done. About $250,000 dollars were spent to evaluate claims contiguous to the Lupin orebody and about $450,000 dollars were spent on regional exploration.

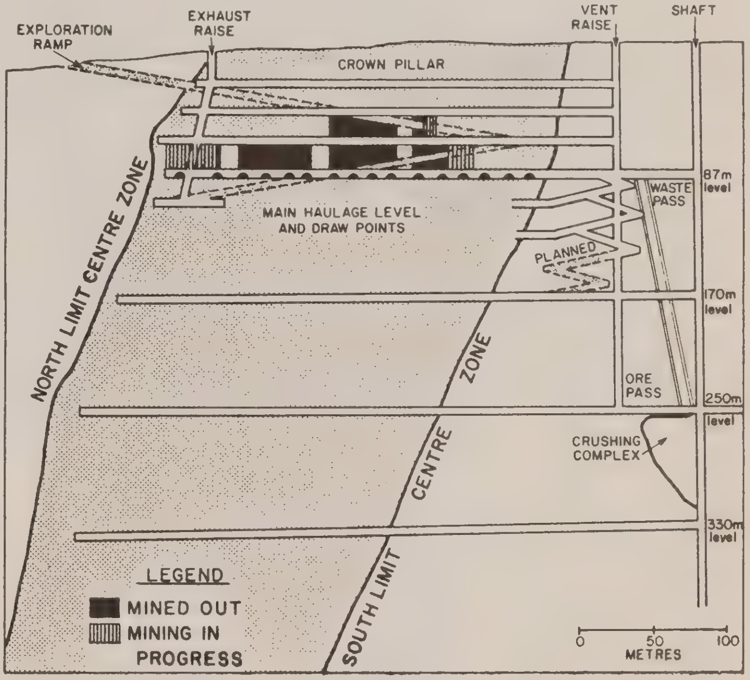


FIGURE 2-12: Idealized longitudinal section of Lupin Centre Zone showing development as of April, 1983 (from Echo Bay Mines Ltd. annual report, 1982)

B-ZONE MINE

Cullaton Lake Gold Mines Ltd.	Gold
(now Royex Gold Mining Corp.)	65 G/1,7,8
916 - 111 Richmond St. W.	61°17'N,98°31'W
Toronto, Ont., M5H 2G4	

REFERENCES

Eade (1966,1974); Hamilton (1981); Laporte (1983b); Lee (1959); Lord (1953); Page (1981); Wright (1967).

PROPERTY

Lease 3019 totalling 950 ha and comprising the following claims: AIR 1-12, 1 CEP claim, 13 DWE claims, GILT 1-15, 17-22, 25-29 and 1 SUE claim.

LOCATION

The claims are about 840 km east-southeast of Yellowknife, 400 km northwest of Churchill and 600 km north of Thompson. The property is accessible via a 1.5-km-long airstrip north of the mine that can accommodate Hercules aircraft. A lake about 300 m from the airstrip can accommodate float-equipped aircraft. Staging areas for aircraft are mainly Thompson and Churchill.

HISTORY

The bedrock and surficial geology of the mine area was mapped on a regional scale (1:1,000,000 and 1:500,000) by Lord (1953), Lee (1959) and Wright (1967). Reconnaissance-scale (1:250,000) geological mapping was done by Eade (1966, 1974) and a detailed study of the B-Zone deposit was undertaken by Page (1981).

The following historical information is mainly from Laporte (1983b). Prospectors exploring Prospecting Permit 17 (NTS 65 G/8) for Selco Exploration Company Ltd. in 1961 discovered boulders of gold-bearing quartz-magnetite iron-formation and staked the ANT 1-36 claims to cover the showings. The following year, Selco acquired Prospecting Permit 26 (NTS 65 G/7) and added the ANT 37-44 and JOE 1-8 claims before the permits expired in 1964-1965. Two zones of iron-formation, the A and B Zones, were identified on the claims and evaluated by geological mapping, geophysical surveying (magnetometer, EM and SP), geochemical surveying (lake water, peat and boulder sampling), trenching and diamond drilling between 1961 and 1964. Drill holes intersected erratically distributed concentrations of gold in the B-Zone along a strike length of 300 m, across a width of about 100 m and to a depth of about 100 m. The highest-grade intersection was 72 ppm gold across 1.2 m, and ore-grade intersections up to 3.6 m wide were reported.

The ANT and JOE claims lapsed and were restaked in 1972 as the GILT 1-15, 17-22 and 25-29 claims for Royex Mining Limited, Sturgex Mines Limited and Hewlet Mines Limited. O'Brien Gold Mines Limited purchased the Hewlet interest in 1973 and acquired additional claims from Selco. The DWE 1-3 claims were added to the property in 1973 and the DWE 4-13 and AIR 1-12 claims were added in 1974. Twenty-nine drill holes totalling 3313 m were drilled on the B-Zone in 1973. Road and airstrip construction and maintenance were done in 1974-1975, and a camp was built in 1976.

Under the terms of an option agreement granted to Consolidated Durham Mines and Resources Limited in 1975, a 2.45-m by 4.75-m decline was driven 106 m into the B-Zone in 1976. Bulk sampling and underground drilling in 1977 indicated probable and inferred potential of about 272 kt grading 38.7 g/t gold to a depth of about 120 m (O'Brien Energy and Res. Ltd. Annual Report, 1977). Preliminary leaching tests indicated that 70% to 80% of the contained gold could be recovered by vat or batch leaching. No further development work was done in 1978. The surface facilities were maintained and the decline was dewatered in 1979, at which time the interest in the project among the partner firms stood at:

79.4%	O'Brien Gold Mines Ltd. and Consolidated Durham Mines and Resources Ltd.
18.0%	Royex-Sturgex Mining Ltd.
2.6%	Selco Mining Corporation Ltd.

In 1980 the CEP and JOE claims were added to the property and Cullaton Lake Gold Mines Ltd. was formed to develop and operate the mine; O'Brien and Durham being the majority shareholders. Surface facilities were completed during 1980-1981 and a spiral ramp was driven to the 400-ft level. Production began in October of 1981, but start-up problems were experienced and only 14 kg of gold were produced that year.

DESCRIPTION

The B-Zone Mine lies within the Churchill Structural Province of the Canadian Shield in the Kaminak Subprovince, an Archean greenstone belt that extends from the Saskatchewan border to Rankin Inlet (Page, 1981). The stratigraphy of the Kaminak Subprovince is outlined in Table 2-12. The oldest rocks are intercalated volcanics and sediments of the Archean Henik Group, which is divisible into a lower, mainly volcanic unit and an upper, mainly clastic unit that is considered to be a turbidite sequence deposited in a subaqueous, eugeosynclinal environment (Page, 1981).

In the Cullaton Lake area, the Montgomery Lake Group of Table 2-11 is absent and the Henik Group is unconformably overlain by metasediments of the

TABLE 2-12 : STRATIGRAPHY OF THE KAMINAK SUB-PROVINCE SHOWING THE POSITION OF THE B-ZONE AND SHEAR LAKE GOLD DEPOSITS (from Page, 1981)

TIME			GROUP	LITHOLOGY	
CENOZOIC					Moranic Material; Sand, Silt, Clay
PRECAMBRIAN	PROTEROZOIC	HELIKIAN		INTRUSIVES	Gabbro Dykes Granite Granite, Quartz Monzonite, Granodiorite
PRECAMBRIAN	PROTEROZOIC	APHEBIAN	HURWITZ GROUP	CLASTICS	Quartzite, Arkose, Argillite, Minor Dolomite Intrusive Gabbro Sills Impure Quartzite, Arkose, Dolomite Greywacke, Siltstone Dolomite, Argillite, Siltstone, Iron Formation Slate, Shale, Siltstone, Greywacke Orthoquartzite, Arkose Boulder Conglomerate, Greywacke
PRECAMBRIAN	PROTEROZOIC		MONTGOMERY LAKE GROUP	CLASTICS ✪ SHEAR LAKE	Siltstone Quartzite, Greywacke Boulder Conglomerate
PRECAMBRIAN	ARCHEAN			INTRUSIVE & METAMORPHOSE SEQUENCE	Gabbro, Metagabbro Dykes Granodiorite, Quartz Diorite, Monzonite Granodiorite Gneiss, Granite Gneiss Quartz Feldspar Biotite Schist & Gneiss Hornblende-Chlorite Schist & Gneiss
PRECAMBRIAN	ARCHEAN		HENIK GROUP	CARBONATES	Dolomite Metadolomite
PRECAMBRIAN	ARCHEAN		HENIK GROUP	CLASTICS ✪ B-ZONE	Greywacke Argillite Phyllite Tuff Banded Iron Formation
PRECAMBRIAN	ARCHEAN		HENIK GROUP	VOLCANICS	Minor Rhyolite Basalt Andesite

Aphebian Hurwitz Group (Fig. 2-13), which hosts the Shear Lake deposit (refer to Table 2-1). The rocks of the Henik Group have been metamorphosed to lower greenschist facies and are preserved in a basinal structure that has undergone two periods of folding and faulting. The most extensive deformation occurred during the Hudsonian Orogeny when strata were drawn into folds with north-northwest-trending axes and west-dipping limbs.

The following description is mainly from Laporte (1983b). The B-Zone deposit is a 75-m to 125-m-thick and 250-m-long segment of a discontinuous iron-formation that has been traced for 2400 m in greywacke, argillite and thin pillowed lavas of the Archean Henik Group. Four facies of iron-formation are present in the area (Page, 1981). Carbonate facies, 76 m to 91 m thick, overlies the oxide, silicate and sulphide facies and is composed of chert, sericite, at least 15% ferroan dolomite and minor euhedral pyrite and pyrrhotite. Precious metal content is 0.01 to 0.10 ppm Au and 0 to 1.0 ppm Ag. The carbonate facies iron-formation consists mainly of ellipsoidal chert/carbonate nodules, 2.5 to 4 cm long, in a fine-grained matrix of sericite and carbonate, but locally it consists of undeformed, fine-grained laminae that may enclose thin argillaceous bands. The silicate facies is 30 cm to 6.1 m thick and grades into oxide facies. It consists of chert/ankerite nodules in a fine-grained matrix of chlorite, stilpnomelane, minnesotaite and siderite. This facies contains 0.10 to 1.5 ppm Au and 0 to 1.0 ppm Ag. The oxide facies texturally resembles the silicate facies with chert/siderite nodules in a fine-grained magnetite-chlorite-siderite matrix. Locally the facies consists of alternating chert and magnetite-rich layers. Minor ankerite is associated with the cherty intervals and the magnetite-rich layers consist of octahedral grains of magnetite in a fine-grained matrix of iron silicates and siderite. The oxide facies is 6 m to 45.7 m thick and contains 0.01 to 2.0 ppm Au and less than 1.0 ppm Ag.

The gold is in the sulphide facies, which ranges in thickness from 61 cm to 17.4 m and occurs within or bordering the oxide facies. Pyrrhotite, pyrite, and minor arsenopyrite and chalcopyrite form 5% to more than 20% of the rock. Magnetite, siderite, iron silicates and the sulphides form iron-rich units crudely layered with chert. Gold grains, 3 to 10 micrometres wide, occur within the non-metallic gangue minerals and along the sulphide grain boundaries. Little gold is enclosed in the sulphide grains and no one sulphide can be used as an indicator of the presence of gold. The sulphide facies contains 1.0 to 200 ppm Au and 2 to 25 ppm Ag.

Analysis of drill sections, in which the rocks are only divided into greywacke, quartz-carbonate-chlorite and quartz-magnetite iron-formation, indicates that the iron-formation is intensely folded and ranges from 3 m thick at 29+50 N to 60 m thick at 25+50 N (Fig. 2-14). The north-northwest-trending iron-formation is near vertical at surface, but gradually flattens out and dips 60^{0} west at the 400-ft level. Three shallowly dipping, northwest-trending normal faults dissect the iron-formation in the area of the B-Zone. These low-angle faults and the iron-formation are in turn displaced along steeply dipping, east-northeast-trending strike-slip hinge faults. Movement along the strike-slip faults ranges from right lateral near surface, to left lateral at the 300-ft level (section 27+00 N), to right lateral at depth.

Page (1981) reviewed theories on the origin of

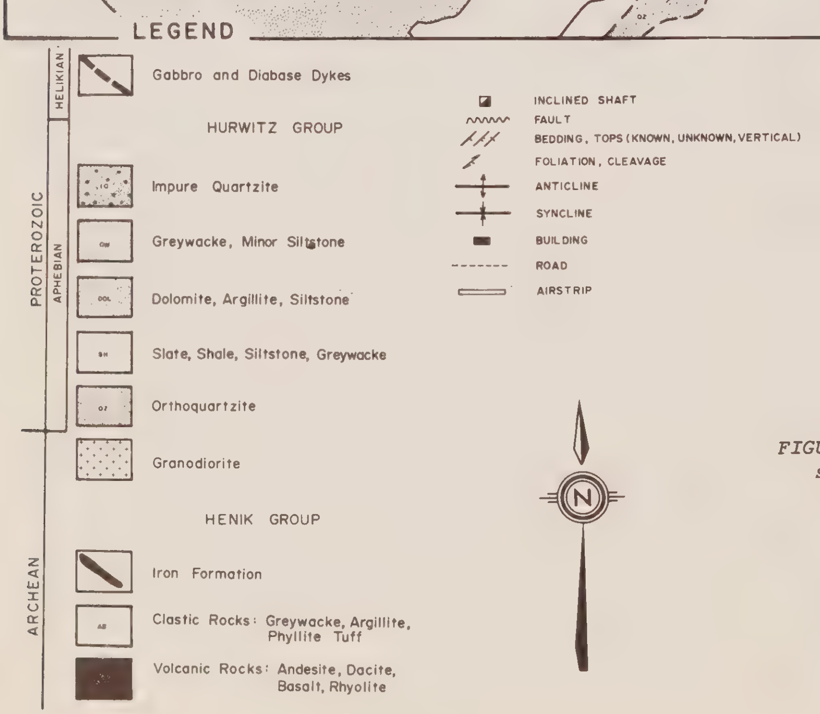


FIGURE 2-13: Geology of the Cullaton Lake area showing the B-Zone and the Shear Lake Zone (from Page, 1981)

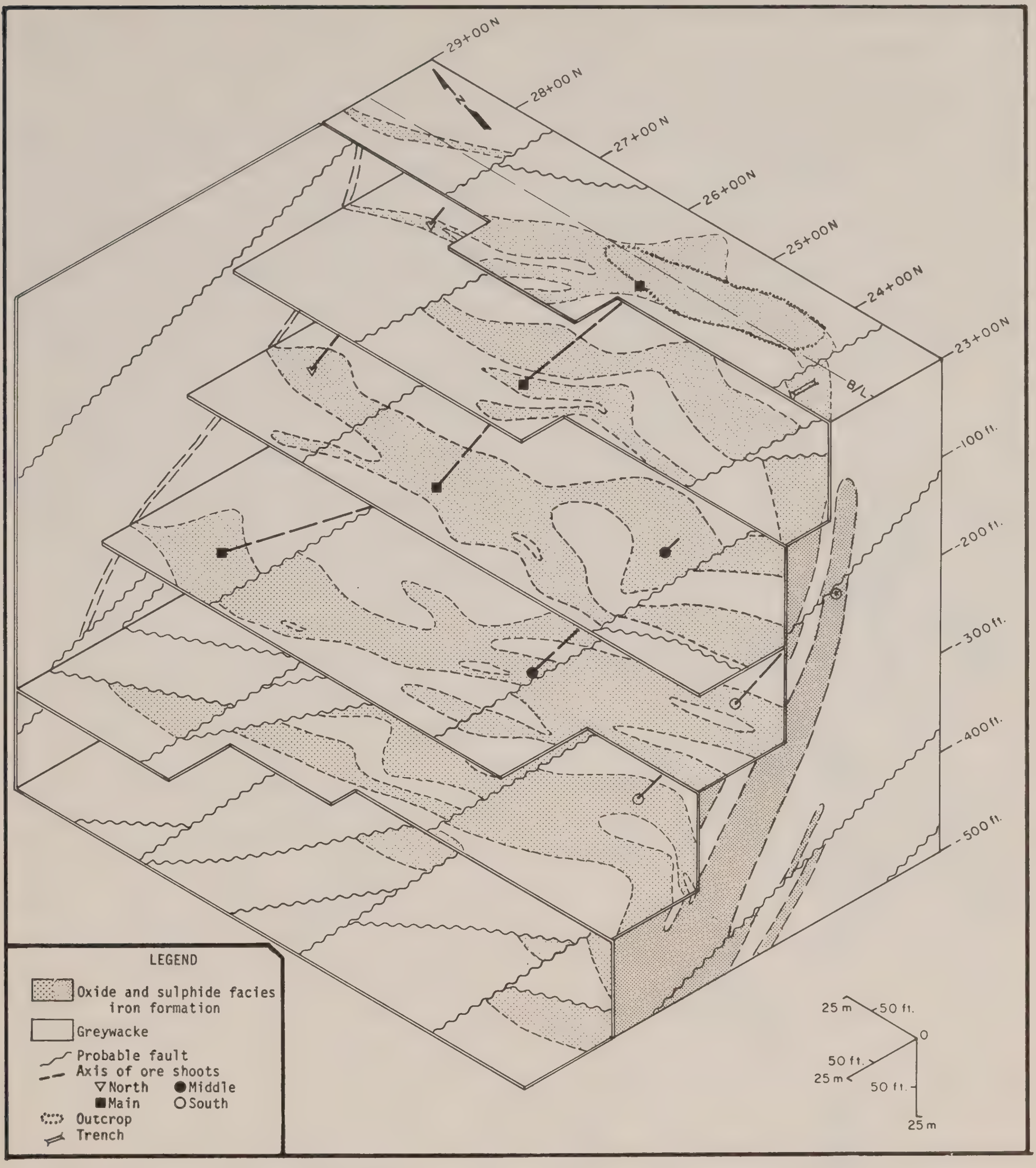


FIGURE 2-14: Isometric diagram of the B-Zone oxide and sulfide facies iron-formation (from Laporte, 1983)

Archean iron-formations and postulated that the association of the B-Zone iron-formation with an eugeosynclinal environment supports an exhalative concept of formation. He suggests that hydrothermal solutions transported the gold as chloride or sulphide complexes and that the gold was precipitated as a consequence of changing physiocochemical conditions such as temperature, pressure, pH, oxygen fugacity and sulfur activity. He cites examples of modern hot springs in New Zealand where precipitates of sulfide and opaline silica contain up to 85 ppm gold and compares the B-Zone deposit to other Archean iron-formation-hosted gold deposits such as the Homestake Mine in South Dakota and the Pickel Crow Mine in Northwestern Ontario.

CURRENT WORK AND RESULTS

Start-up problems experienced in 1981 were gradually resolved after management of mining operations was taken over by Camchib Resources Incorporated in May of 1982. Gold recoveries increased from about 60% in June to about 95% in December. Although mill throughput gradually increased, the average for 1982 was still only 66% of the mill's 272-tpd design capacity. Ore grades were not as high as anticipated, resulting in a downward recalculation of ore reserves at year-end (Table 2-13).

The B-Zone Mine was officially deemed to have attained commercial production at the beginning of 1983, a year in which the mill operated at design capacity and sufficient new reserves were outlined to replace the ore mined (Table 2-13).

Mine development during 1982-1983 included about 550 m of drifting (Fig. 2-15) to extend mine workings to the north and south along the strike of the iron-formation and to probe deeper levels of the deposit.

Cullaton expects to increase gold production by about 600 kg to about 1800 kg of gold per year. About 360 tpd of millfeed is expected in the future from the Shear Lake Mine, 5 km north of B-Zone. Processing changes and modifications of the mill are being tested to accommodate a blend of Shear Lake and B-Zone ores. For more information on Shear Lake, refer to the introduction to this chapter as well as Table 2-1 and Chapter 5. Additional information on the extensive exploration done by Cullaton in the area can be found in Chapter 5 under the heading Cullaton Lake Project.

TABLE 2-13: PRODUCTION AND RESERVES, B-ZONE MINE 1981-1983

	PRODUCTION		RESERVES	
Year	kt Mined	kg Au Recv'd	kt Reserves	g Au/t
1981	9	14	278	25.0
1982	66	695	150	17.0
1983	102	1147	154	17.1

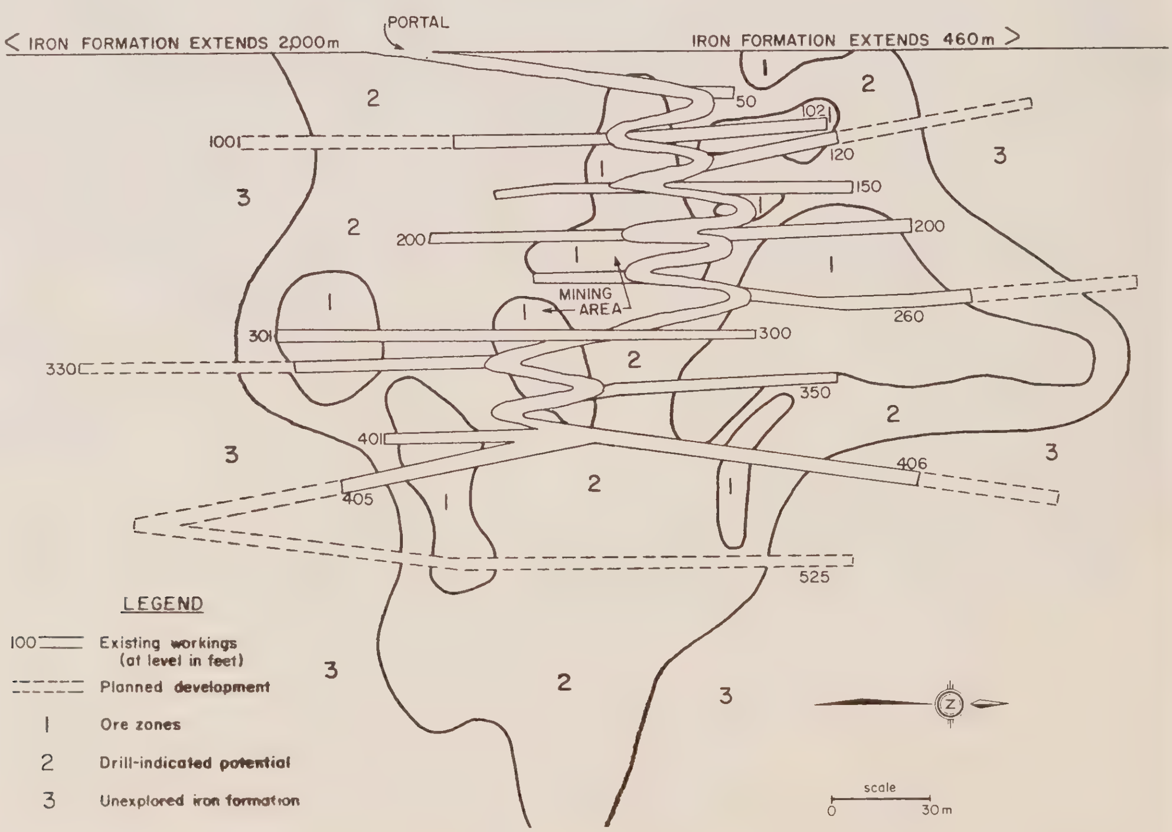


FIGURE 2-15: Idealized longitudinal section of B-Zone showing mine development and the disposition of ore zone (from annual report, Cullaton Lake Gold Mines, 1983)

SILVER MINES: ELDORADO, SILVER BEAR (NORTH), NOREX AND SMALLWOOD

INTRODUCTION

The Eldorado, Silver Bear (North), Norex and Smallwood mines are in the northern half of the Aphebian Great Bear Volcano-Plutonic Complex in the Bear Structural Province (Fig. 2-16). This complex, which has also been called the Great Bear Batholith and the Great Bear Magmatic Zone, comprises a "multitude of gregarious plutons, mostly biotite- and hornblende-bearing, that intrude their own volcanic cover. All of the non-plutonic rocks in the Great Bear Magmatic Zone are termed the McTavish Supergroup" (Hildebrand, 1983). The McTavish Supergroup is up to 10 km thick and has been metamorphosed under sub-greenschist facies conditions; folded about gently plunging, northwest-trending axes; intruded by tabular to sheetlike epizonal granitoid plutons and cut by a series of northeast-trending, right-lateral strike-slip faults. The McTavish Supergroup has been subdivided into three groups separated by unconformities. In ascending order, these are the Labine, Sloan and Dumas Groups. The Labine Group, which hosts all the silver deposits in the Echo Bay and Rainy Lake mining camps (Fig. 2-17), is an early Proterozoic volcanic arc developed upon continental crust (Hildebrand, 1981a).

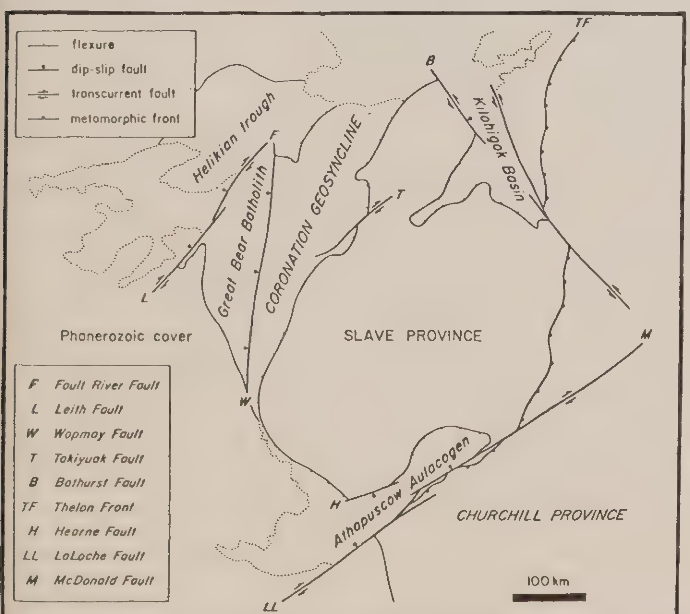


FIGURE 2-16: Great Bear Batholith and other structural elements of the Northwest Canadian Shield. Dotted lines are the shores of Great Slave Lake, Great Bear Lake, and the Arctic coastline (from Hoffman and McGlynn, 1977)

The Echo Bay Mining Camp includes the Eldorado, Contact Lake, Echo Bay, Bonanza and El-Bonanza silver mines, none of which are presently operating, although the Eldorado Mine of Echo Bay Mines Limited produced a small quantity of silver during the first quarter of 1982 (Tables 2-1, 2-2). Because of the limited activity at Eldorado during the period under review (1982-1983), Eldorado will not be described in this volume; refer to the previous Mineral Industry Report (Brophy, 1984) for a detailed description.

The Rainy Lake Mining Camp (also referred to as the Conjuror Bay or Camsell River mining camp) includes the Silver Bear (North), Norex, Smallwood and Northrim mines. All of these mines except Northrim were active during 1982-1983.

The volcano-sedimentary belts that host the silver deposits of the Echo Bay and Camsell River

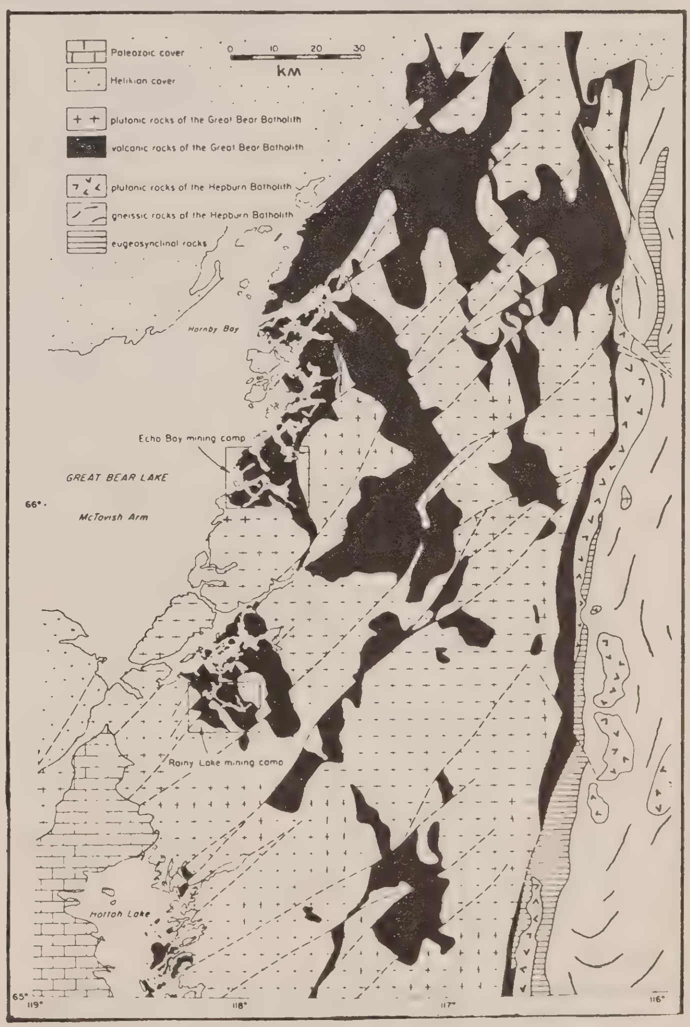


FIGURE 2-17: Geology of the north half of Great Bear Batholith showing the Echo Bay and Rainy Lake (or Camsell River) mining camps, which include all of the silver mines in the area (from Hoffman and McGlynn, 1977)

mining camps once were contiguous, but are now offset by about 30 km along a series of northeast-trending, right-lateral strike-slip faults (Fig. 2-17). The silver deposits are spatially associated with a suite of epizonal, comagmatic, hornblende monzonite-syenodiorite-syenite plutons. The Contact Lake deposit and parts of the Silver Bear deposit are in this plutonic suite; most of the other deposits are within one kilometer of the contact. Field relations and sulfur isotope studies indicate that the deposits are of magmatic-hydrothermal origin (Badham, 1975). Silver-bearing veins are typically polymetallic and are localized in dilational zones developed by repeated movement on bent or splayed northeast-trending faults and related, east-trending cross-faults.

SILVER BEAR (NORTH), NOREX AND SMALLWOOD MINES

Terra Mines Ltd.	Silver
#202, 7608 - 103 St.	86 E/9, 86 F/12
Edmonton, Alta., T6E 4Z8	$65^{0}35'$N to $65^{0}36'$N
	$117^{0}57'$W to $118^{0}06'$W

REFERENCES

Badham (1972, 1973a, 1973b, 1975); Badham and Morton (1976); Brophy (1984); Hildebrand (1980a, 1981b, 1983); Hoffman and McGlynn (1977); Padgham and others (1974); Shegelski and Murphy (1973); Shegelski and Thorpe (1972).

PROPERTY

The Silver Bear Mine (86 E/9) is on mining lease 2335, which covers 179 ha and comprises claims A 1-2, A 5-9 and A 14-15. The Norex and Smallwood mines (86 F/12) are on mining lease 2345, which covers 87 ha and comprises claims ITLDO 2-7.

LOCATION

The Silver Bear mine is immediately south of the Camsell River, 405 km north-northwest of Yellowknife. It is serviced by a gravel airstrip. Norex and Smallwood are about 10 km to the east-southeast and are connected to the mill at Silver Bear by an all-weather gravel road.

HISTORY

The Silver Bear Mine is on property staked in the 1940's as the YAW group and drilled in the 1960's by Eldorado Mining and Refining Limited and Echo Bay Mines Limited. The ground was restaked as the A group in 1966 and acquired by Silver Bear Mines Limited, the assets of which were taken over by Terra Mines Limited the following year. Mining commenced at Silver Bear in 1969 after considerable underground development and completion of a 270 tpd mill capable of producing separate Ag-Bi and Cu-Ag concentrates. The North Mine was discovered in 1976 when deep drilling intersected ore beneath the Camsell River. A crosscut was driven northerly on the 600-foot level of the Silver Bear Mine to gain access to the North Mine, which began production in 1979.

The Norex Mine is on property staked as the Elite claims in 1932 and restaked as the ITLDO claims in 1960. Caesar Silver Mines Ltd. was formed in 1967 to develop the property. The claims were optioned to Norex Resources Limited in 1969 after surface drilling and limited underground development had outlined ore in a silver-bearing vein, the Graham Vein. Open-pit mining began in 1970 after completion of a 45 tpd test mill. In 1971 a decline was started and surface drilling completed to probe the Graham Vein at depth. Terra Mines Limited acquired a 50% interest in the Norex property in 1972 and began hauling stockpiled ore by ice road to the Terra mill. By 1974 a gravel road connecting Norex to Silver Bear was completed. The decline to the Graham Vein was completed in 1977 and stopes were worked on the 160-foot and 300-foot levels. The most productive years at Norex were 1977 and 1978, when almost 38,000 kg of silver were won from only 14.3 kt of ore (Terra Mines Ltd. Annual Reports, 1977 & 1978). In 1980, Terra purchased the 50% interest held by Norex and became sole owner of the property.

The Smallwood Mine was discovered in 1978 after surface drilling outlined ore about 760 m southeast of the Norex workings. A decline into Smallwood was advanced 517 m by the end of 1979.

During 1980 and 1981, production at all of the Terra mines was sharply curtailed as emphasis was shifted to exploration and development. Only 28 kt of ore were mined and 11,000 kg of silver produced, compared to 60 kt mined and 60,000 kg produced during the previous two years. Almost all of 1980 and 1981 production was from the Silver Bear Mine.

DESCRIPTION

The Camsell River silver deposits are in volcanic and sedimentary rocks of the Labine Group. The following summary of the geological evolution of the

TABLE 2-14: TABLE OF FORMATIONS, RAINY LAKE AREA (from Hildebrand, 1983)

late Proterozoic					
			Gunbarrel Gabbro		coarse grained gabbro
			intrusive contact		
early Proterozoic					
			Cleaver Diabase		altered diabase dykes
			intrusive contact		
GREAT BEAR MAGMATIC ZONE			Hooker Megacrystic Granite		k-feldspar megacrystic granite
			intrusive contact		
			Grouard Porphyries		plagioclase-hornblende-quartz-biotite-k-feldspar porphyritic dykes
			intrusive contact		
			plagioclase porphyry		
			intrusive contact		
			quartz diorite		fine grained quartz diorite
			intrusive contact		
			kqp porphyry		k-feldspar -quartz-plagioclase porphyry
			intrusive contact		
	LABINE GROUP		"younger ash-flow tuffs"		simple cooling units of dacite rhyolite ash-flow tuff
			Animal Andesite		andesite lavas and breccias
			relations uncertain		
		CLUT CAULDRON COMPLEX	Calder Quartz Monzonite		hornblende-biotite quartz monzonite
			intrusive contact		
			Uranium Point Formation		sandstone, conglomerate, lapilli tuff, mudstone, ashstone
			White Eagle Tuff		lithic and crystal-rich dacite ash-flow tuff
				mesobreccia member	breccia
			unconformity		
		"EARLY INTERMEDIATE INTRUSIVE SUITE"	Balachey Pluton		mainly quartz monzonite
			Rainy Lake Intrusive Complex		monzodiorite, monzonite, pseudosyenite
			intrusive contact		
		BLACK BEAR CAULDRON COMPLEX	Camsell River Formation		andesitic lavas, breccias, ash-flow tuff, sandstone, mudstone, conglomerate
			Terra Formation		mudstone, sandstone, limestone, breccia, rhyolite flows, ashstone
			Moose Bay Tuff	ash-flow tuff member	rhyolitic ash-flow tuff, andesite, sandstone
				lower member	sandstone,mudstone, breccia, andesite, limy argillite
			unconformity		
			unnamed sills		gabbro, diabase.
			intrusive contact		
			unnamed dykes		plagioclase, quartz, k-feldspar porphyritic dykes
			intrusive contact		
			Bloom Basalt		pillow basalt, breccia, tuff,dolomite
			Conjuror Bay Formation	upper member	mudstone, ashflow tuff, breccia
				lower member	quartz arenite
			unconformity		
HOTTAH TERRANE			unnamed granitoid intrusions		deformed diorite, granodiorite, quartz monzonite
			Holly Lake metamorphic suite		deformed metasedimentary rocks

Labine Group in the vicinity of the mines is drawn from Hildebrand (1983). The oldest rocks, mature crossbedded arenite of the Conjuror Bay Formation (Table 2-14), are overlain by voluminous pillow basalts, associated breccias and aquagene tuff, possibly erupted during a period of extension. A period of uplift was succeeded by subaerial ash-flow eruptions that led to cauldron collapse (Black Bear Cauldron, Table 2-14). Two km of tuff (Moose Bay Tuff) ponded in Black Bear Cauldron, after which the cauldron became the site for fluvial and lacustrine sedimentation (Terra Formation) and then for andesitic volcanism (Camsell River Formation). The Balachey Pluton and the Rainy Lake Intrusion, which are distinctive, sheet-like quartz monzonite-monzodiorite bodies related to the andesitic lavas, were then intruded. These plutons altered their wall rocks to distances of greater than 1 km as they cooled by hydrothermal convection.

The main structure in the vicinity of the mines

is the northwest-trending, gently northwest-plunging Norex Syncline (Hildebrand, 1983), which is cored by volcanic and sedimentary rocks of the Labine Group and is flanked to the southwest by the Rainy Lake Intrusion and to the northeast by the Balachey Pluton. The area is cut by numerous northeasterly trending, right-lateral strike-slip faults. The Silver Bear, Norex and Smallwood mines are associated with these faults (or related cross faults) and are within Labine Group rocks that are close to the contacts of the Rainy Lake Intrusion or the Balachey Pluton.

The Silver Bear Mine is on the southwest limb of the Norex Syncline near the north boundary of the Rainy Lake Intrusion. It is hosted in the Terra Formation (formerly the Arden Formation of Hildebrand, 1981b), which consists of an upper member comprising lithic arkose, calc-argillite, conglomerate, siltstone and mudstone, and a lower member comprising mudstone, breccia, cherty tuff, lapilli tuff, siltstone and limey mudstone (Hildebrand, 1981b). Most ore is in the upper member, which in the mine area contains more than 10% banded and disseminated sulfides; mainly pyrite, pyrrhotite and chalcopyrite, but also argentite, Co-Bi arsenides, native silver and native bismuth. The banded and disseminated sulfides, too low grade to constitute ore, serve as a useful guide for exploration since silver-bearing veins are commonly in the sulfide-rich zones.

Ore is concentrated in steeply to moderately south-dipping, northeast - striking quartz-carbonate-hematite vein systems that cut the banded sulfides. The veins, which are usually less than 1 m wide, are related to an east-northeast-trending splay from a major northeast-trending fault to the west. The veins are composite and complex, containing silver-bearing pods surrounded by a thin halo of silicic, hematitic, chloritic and carbonate alteration (Badham, 1975). Associated minerals include skutterudite, safflorite, rammelsbergite, pararammelsbergite, matildite and sphalerite. Ore is also found in thin gash veins that trend north to northeast and dip steeply west. Recently, ore-bearing veins have been found in fractures in the syenite to the south.

The North Mine lies immediately north of Silver Bear and is in the Camsell River Formation, a series of andesitic to basaltic flows, tuffs and breccias that overlie the Terra Formation. Silver-bearing veins are associatéd with a fault that underlies the Camsell River. The veins strike easterly and dip 70°--80° south.

Both the Norex Mine and the Smallwood Mine, which is 3/4 km southeast of Norex, are on the northeast limb of the Norex Syncline within a kilometer of the Balachey Pluton contact. They are hosted in andesitic flows and ash flow tuffs of the Camsell River Formation (Fig. 2-18). These country rocks are fractured, chloritized, albitized and locally impregnated by iron, lead and zinc sulfides. Ore-bearing veins at Norex (and at Smallwood?) are emplaced in easterly trending tension fractures between two major northeasterly trending faults.

The Graham Vein at Norex is the principal of five steeply dipping, east-southeast-trending quartz-carbonate veins occupying a 100-m-wide zone of chlorite-epidote alteration. The Graham Vein is about 200 m long and is generally less than 1 meter wide. Ore lenses in dilational parts of the vein contain native silver, native bismuth, hematite and a variety of sulfides and arsenides. According to Blackwell (1974), the mineral suite is comparable to that of the nearby mines, but the ore appears to be more siliceous and to contain less carbonaceous, uraniferous, phosphatic and antimony-rich mineral"

At the Smallwood Mine, a number of silver-bearing veins cut sulfide-rich altered tuff and andesite. One of them, the No. 4 Vein, is longer and wider, but lower grade, than other silver-bearing veins found in the area. Its occurrence in a 5-m-wide fracture zone distinguishes it from other productive veins.

CURRENT WORK AND RESULTS

Production resumed in the second quarter of 1982 after a hiatus in 1981 when activities focused on exploration and development. Production from the Terra-operated mines between 1976 and 1983 is summarized in Table 2-15, which shows that record tonnage was milled and near-record silver output was obtained in 1983. The average grade of the ore, however, was only about half that of the earliest years of operation. Installation of a new ball mill late in 1983 doubled the mill capacity from 180 to 360 tpd. It is anticipated that this expansion will reduce energy costs in 1984 without sacrificing output; the same amount of ore will be processed using only half the usual milling time.

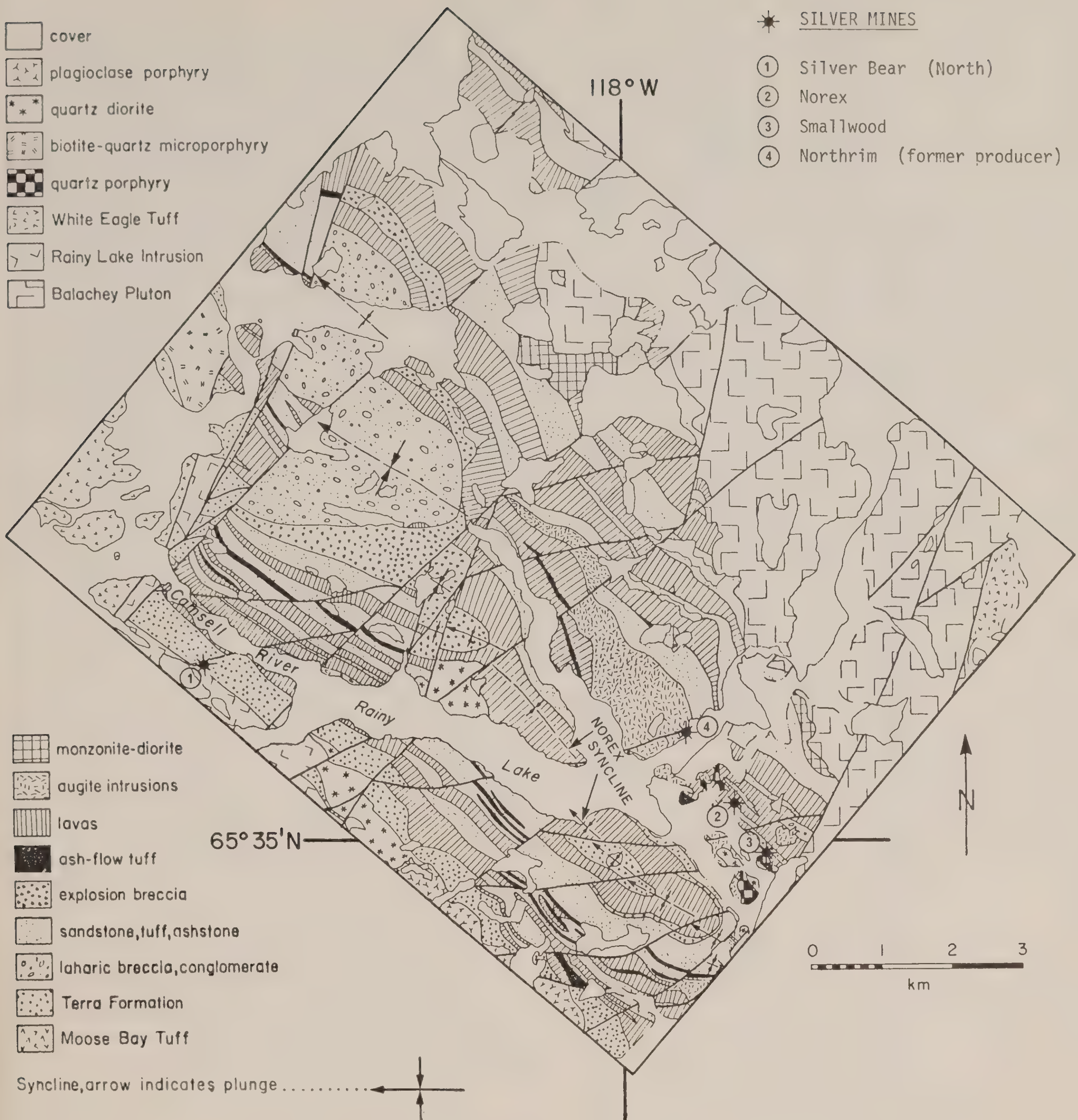


FIGURE 2-18: Generalized geological map of the Camsell River area showing silver mines and the complex facies relationships between various rock types in the Camsell River Formation (from Hildebrand, 1983)

TABLE 2-15: PRODUCTION, TERRA OPERATIONS, 1976 to 1983

YEAR	kt Mined	kg Ag Recv'd	% Split*	kg Ag/t
1976	41.5	58000	100/00/00	1.40
1977	33.2	45900	70/30/00	1.38
1978	33.6	46000	48/52/00	1.37
1979	26.9	13700	88/12/00	0.51
1980	27.9	9700	95/05/00	0.35
1981	?	1800	100/00/00	?
1982	36.6	26717	75/18/07	0.73
1983	72.2	46654	**59/37/04	0.65

**percent of silver production from each of the mines... Silver Bear/ Norex/ Smallwood*

data from 1983 Terra Mines annual report and Mining Inspection Service, Gov't NWT.

***this data is from the 1983 Terra annual report. Mining Inspection Service data shows a higher percentage of the split from Silver Bear.*

Silver Bear (North)

Most of Terra's silver output in 1982 and 1983 came from the Silver Bear Mine, mainly from previously developed workings that were re-examined and found to be productive. The following development at Silver Bear during 1982-1983 was reported to the Mining Inspection Service, Gov't of the NWT: lateral advance 1400 m, raising 850 m, underground drilling 8080 m and surface drilling 1180 m. Development took place on 11 of the mine's 13 levels (levels are about 30 m apart), but about 65% of the lateral advance was on the first 5 levels.

In the North Mine, drilling outlined 1 kt of ore grading 1.4 kg Ag/t. It was reported that this tonnage would be mined by the end of 1982 (pers. comm., Barry Way, former mine geologist).

Norex

About 22% of Terra's silver output in 1982-1983 was from the Norex Mine, which produced during the last quarter of 1982 and during the first and last quarters of 1983. Intervening times were spent mainly on development; an incline was driven to intersect an ore-vein (No. 3 Vein) discovered during drilling in 1981, and a decline was driven to open up a fifth level (levels are about 30 m apart). The following development during 1982-1983 was reported to the Mining Inspection Service, Gov't of the NWT: lateral advance 2342 m, incline 21.5 m, decline 112 m, raising 916 m, surface drilling 6257 m and underground drilling 12,800 m. Much of the drilling in 1983 was to follow up two previously obtained drill intersections about 8 m apart at a depth of 244 m below surface; one grading 6.9 kg Ag/t across 3.8 m and the other 1.4 kg/t Ag across 1.5 m.

Smallwood

The Smallwood Mine accounted for about 5.5% of Terra's silver output during 1982-1983. Production at Smallwood commenced during the last quarter of 1982, but development was the main focus during the period under review. The following development during 1982-1983 was reported to the Mining Inspection Service, Gov't of the NWT: lateral advance 1886 m, decline 275 m, raising 614 m, underground drilling 6246 m and surface drilling 9708 m. At least 750 m of advance was through country rock grading 0.3% Cu and 13.7 g Ag/t (personal communication, Barry Way, former mine geologist). In addition, appreciable sphalerite and galena were observed; one sample of altered tuff collected underground had at least 5% finely disseminated sphalerite.

Prospecting and soil sampling were conducted in the vicinity of Smallwood and Norex in 1982. Soils were analyzed for silver, copper, cobalt, bismuth, lead, zinc and nickel. Survey results are not known.

ZINC-LEAD MINES: PINE POINT, POLARIS AND NANISIVIK

INTRODUCTION

Pine Point, Nanisivik and Polaris are considered to be Mississippi Valley-type (MVT) deposits, the characteristics of which have been described by Ohle (1959), Brown (1970), and more recently by Anderson and Macqueen (1982).

1. The deposits occur mainly in dolostone
2. The dominant ore minerals are sphalerite and galena, the former usually predominating
3. Ores are relatively lean in precious metals
4. Sphalerite is usually of low iron content
5. Sphalerite and galena are coarsely crystalline, especially in cavities that are abundant in this type of deposit
6. Host rocks are generally not regionally metamorphosed
7. The ores are mainly stratabound
8. Igneous activity is minor or lacking
9. Ores were formed at low temperatures, in the range of 100-150^{o}C
10. Most deposits are in Paleozoic rocks

11. Most deposits are found at or near the edges of basins as presently preserved, or on arches between basins
12. Individual deposits tend to cluster in districts that may be distributed over hundreds of square kilometres, which argues against strictly local sources for metal and sulfur
13. Most deposits are in relatively undisturbed platformal carbonates, or within foreland fold and thrust belts
14. Deposits are closely controlled by pre-existing porosity.

Of the three lead-zinc mines in the NWT, the deposits being exploited at Nanisivik meet fewest of the above-listed characteristic criteria for MVT deposits. The age of the host rocks and of the lead-zinc deposits at Nanisivik are Precambrian; the silver content of the ore is relatively high (about 60 g/t or 2 oz/ton); the geological environment is a rift zone; and the deposits in the hosting formation lie within several km of the mine site - efforts to find deposits further afield have not been successful. In addition, the Nanisivik deposits contain about two to three times as much iron sulfides (30% to 40%) as the average in deposits at Pine Point or Polaris (6% to 15%). It is also notable that whereas the formation hosting the Nanisivik deposits is dolomite, those hosting the Pine Point deposits and Polaris deposit are mainly limestones that have been dolomitized only locally. In view of the above, assigning the Nanisivik deposits to the MVT "pigeonhole" is questionable.

PINE POINT MINE

Pine Point Mines Ltd.	Zinc,Lead
Pine Point, NWT	85B/15,16
XOE OWO	N-42 deposit at:
	60°50'50"N,114°27'12"W

REFERENCES

Anderson and Macqueen (1982); Beales and Jackson (1966, 1968); Billings and others (1969); Campbell (1967); Cumming and Robertson (1969); Gibbins (1983); Jackson and Beales (1967); Kyle (1980, 1981), Lajoie and Klein (1979); Macqueen (1975); Macqueen and Powell (1983); Medford and others (1983); Norris (1965); Paterson (1972); Rhodes (1981); Rhodes and others (1984); Roedder (1968); Seigel and others (1968); Skall (1975, 1976); Smith and others (1983); Williams (1981). The paper by Rhodes and others (Econ. Geol., v. 79, 1984) is the most recent and perhaps most definitive report on the geology and mineral deposits of the Pine Point area.

PROPERTY

4,476 leased claims as follows:

LEASE	LOT	GROUP	CLAIMS
2828-2851			24
2878			994
2278	129	864	26
2280	130	864	32
2328	131	864	1
2329	575	814	816
2418	587	814	49
2419	601	814	30
2519	586	814	50
2553	646	814	68
2599	656	814	2
2600	657	814	5
2638	652	814	1
2639	588	814	124
2640	138	864	54
2641	139	864	22
2645	141	864	41
2646	142	864	19
2647	146	864	1
2648	147	864	1
2649	645	814	138
2650	600	814	8
2651	638	814	1
2652	649	814	8
2653	149	864	1
2654	150	864	3
2656	140	864	44
2657	594.1	814	97
2678	644	814	86
2679	653	814	72
2680	594.2	814	11
2681	151	864	2
2682	145	864	35
2683	659	814	77
2706	662	814	94
2790	665	814	15
2431	143	864	50
2432	640	814	111
2433	641	814	57
2330	137.3	864	27
2331	137.1	864	16
2279	137.2	864	115
2689	148	864	124
2776	639	814	6
2870	693	814	18
2871	694	814	12
2872	695	814	18
2892	698	814	754
2956	697	814	1
2957	696	814	115

LOCATION

The claims form a block 53 km long and several km wide on the south shore of Great Slave Lake, 120 km south of Yellowknife. A 97-km highway connects Pine

Point to Hay River and a 1,370 m gravel airstrip is situated near the mill. A spur line of the Great Slave Railway provides concentrate and freight transport.

HISTORY

Prospectors on their way to the Klondike goldfields were directed to sulfide outcrops near Pine Point by natives in 1898. Some claims were staked, but were allowed to lapse because only minor amounts of gold and silver were found. The area was examined again during the 1920's, and in 1929 Northern Lead Zinc Company, formed with financing from Ventures Ltd and Cominco, began a program that lasted two decades and included pitting and drilling. In 1948, a three-year concession of exclusive prospecting rights to 1295 square km was granted to these companies. Over 1000 claims were staked when the concession expired and a new company, Pine Point Mines Ltd, was formed to finance continuing work. Majority interest in Pine Point Mines Ltd is held by Cominco. Construction of a government-financed, 677-km-long railway from Roma (Alberta) to Pine Point began in 1962. During the next three years a townsite was laid out, services installed, the railway completed, a 4500 tpd concentrator constructed and considerable drilling and geophysical surveying (EM and IP) done. First ore from Pine Point was high-grade and was shipped in 1965, just prior to the completion of the mill. The concentrator capacity was increased from 4,500 to 9,000 tpd in 1968; currently 10,000 t of ore are treated daily.

Ore reserves, calculated in 1955 at 4.54 Mt grading 7% Zn and 4% Pb, have since been increased to 23.6 Mt grading 6.3% Zn and 2.7% Pb (Table 2-17). The greater reserves, despite annual production of several million tonnes, reflect successful exploration as well as acquisition of deposits from Pyramid Mining Co in 1966 (X-15 and W-17 deposits), Coronet Mines Ltd in 1972 (R-61 and S-65 deposits) and Conwest-Newconex Canadian Exploration in 1974 (A-55 deposit). The most recent exploration highlight was the 1981 discovery of the N-81 orebody (Fig. 2-19), which is the third-largest orebody found on the Pine Point property at 2.7 Mt grading 21% combined lead-zinc.

To date (1983), almost 51.5 Mt averaging 6.2% Zn and 2.5% Pb have been milled at Pine Point. All production, except for underground test mining of the M-40 deposit, has been from open pits.

DESCRIPTION

About 50 zinc-lead deposits (Fig. 2-19) have been found on the property within carbonates of the Pine Point Group (Table 2-16), a Middle Devonian (Givetian) barrier reef complex that separates deep-water carbonate and shale of the Mackenzie Basin to the north from back-reef evaporite deposits of the Elk Point Basin to the south (Kyle, 1980). The regional geological setting of the barrier complex is depicted in Figure 2-20 and a generalized subcrop map of the Pine Point property is shown in Figure 2-21.

Pine Point sulfide bodies range in size from less than 100 kt to as much as 14 Mt and occur in several stratigraphic positions in a 200-m section of the barrier complex (Fig. 2-22). Metal content of the ore ranges from about 3.0% to 14% zinc and from about 0.8% to 9.0% lead; the district average is about 5.8% zinc and 2.2% lead (Kyle, 1980). The main gangue components are iron (av. 3.5%) and carbonate.

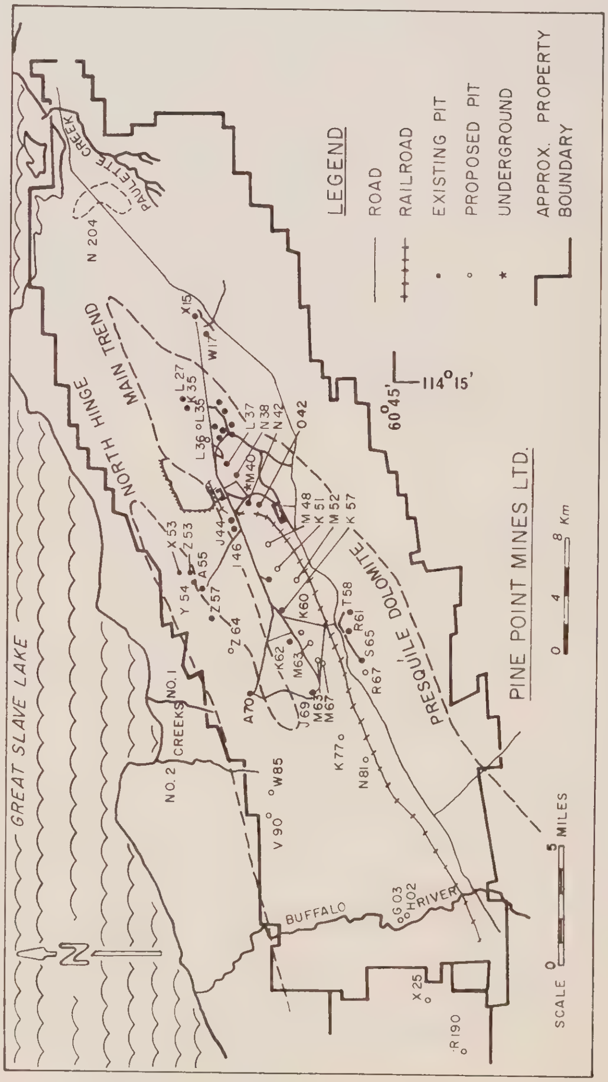


FIGURE 2-19: Deposits, Pine Point Property (from Gibbins, 1983)

TABLE 2-16: TABLE OF FORMATIONS, MIDDLE DEVONIAN, PINE POINT AREA (after Kyle, 1981; Norris, 1965; Rhodes, 1981; Skall, 1975)

FORMATION	DESCRIPTION		MINERALIZ'N
Slave Point	50-70m argillaceous limestone; minor dolostone, mudstone		
Watt Mtn.	15-45m limestone and dolostone, green mudstone interbeds		
	DISCONFORMITY		
Sulfur Point	reefal limestone, extensive coarse crystalline (Presqu'il-ized) dolostone, transitional into Buffalo River Fm. to NW	PINE POINT GROUP, 75-150m	
Buffalo River	calcareous shale		
Pine Point	fine crystalline reefal limestone and dolostone, transitional into Muskeg Fm. to SE		
Muskeg	evaporites		
Keg River	65-75m argillaceous dolostone and limestone		
CHINCHAGA	90-110m anhydrite and gypsum, minor carbonate		

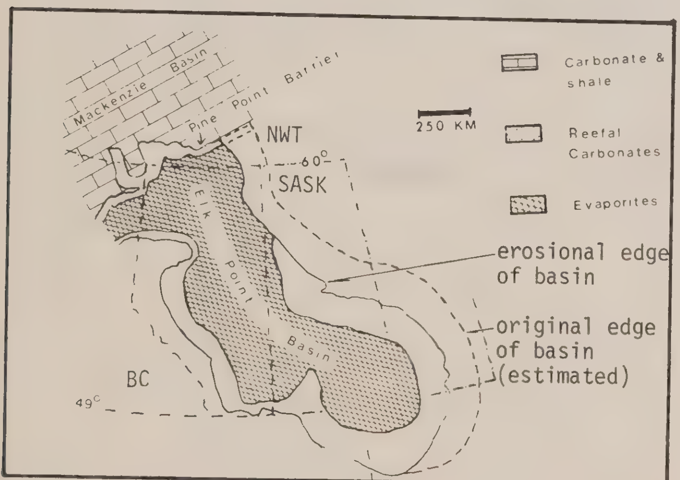


FIGURE 2-20: Middle Devonian stratigraphic relationships, Western Canada (after Kyle, 1981; Skall, 1975)

Skall (1975) subdivided the Pine Point Group and adjacent formations (Table 2-16) into a number of ecological facies and showed that subtle tectonic adjustments along three, N65°E-trending hinge zones were responsible for development of these facies. The North and Main hinges (Fig. 2-19) coincide respectively with the southern limit of marine Facies G and the northernmost extension of a depositional tongue of Facies J (Fig. 2-22). The South hinge coincides with the northernmost evaporites of the Muskeg Formation. Most of the Pine Point ore bodies are within the North and Main hinges (Fig. 2-19).

Karstification, a process that is considered important in preparing the host rock for MVT sulfide mineralization (Beales and Jackson, 1968), is particularly evident below the erosional disconformity at the top of Sulfur Point Formation (Table 2-16). Many of the Pine Point ore bodies (eg.M-40, O-42 and K-57 deposits of Fig. 2-22) are at or near the base of the Sulfur Point Formation in karsted carbonate that has been altered to coarse-crystalline dolostone (Presqu'ile or K Facies of Fig. 2-22).

Two principle types of ore bodies are present at Pine Point, tabular and prismatic (Rhodes, 1981). Tabular deposits are elongate, flat-lying ore bodies associated with an interconnected network of karst channels mainly confined to the base of the Sulfur Point Formation along the North and Main hinges (eg. M-40 deposit of Fig. 2-22). Many of the karst channels are small, but they can attain thicknesses of up to 12 m and widths of up to 240 m, thus constituting ore deposits when mineralized.

Until recently, most Pine Point production has been from prismatic deposits; vertically elongate ore bodies that formed when further dissolution in tabular karst zones caused sagging, foundering and collapse of the overlying strata. Collapse can affect about 100 m of stratigraphy, causing thick accumulations of internal sediment at and above the tabular karst zone (Rhodes, 1981). Prismatic ore bodies (eg. K-57 and O-42 deposits of Fig. 2-22) typically contain about 1 Mt of ore.

Some Pine Point ore bodies are well below the base of the Sulfur Point Formation (eg.X-15 and W-17 deposits of Fig. 2-22) and are thought to have formed because continuing dissolution below tabular or prismatic orebodies allowed them to collapse into underlying strata (Rhodes, 1981). One of the largest deposits on the Pine Point property is N-81 (Fig. 2-19), a collapsed prismatic orebody that was discovered in 1981 when an area covered by frequency-domain IP in 1969 was resurveyed. It contains 2.7 Mt of ore grading 14% Zn and 7% Pb. The N-81 orebody is deep by Pine Point standards, being covered by about 20 m of overburden and 20 m of caprock, and a complex pit design will be needed to exploit the ore.

The origin of the ore deposits at Pine Point is a subject of debate. Campbell (1967) suggested that mineralization was from thermal waters arising along the MacDonald-Hay River fault systems that underlie the Pine Point ore trend. Skall (1975) documents facies changes that he ascribes to reactivation of these basement faults during the Givetian Stage of the Devonian and points out that the statistical mean elongation of individual ore bodies parallels the fault-controlled trend of the Main and North hinges. However, Kyle (1980) remarks that the N65°E trends of the hinge zones do not parallel the N45°E trace of basement faults as determined from aeromagnetic data.

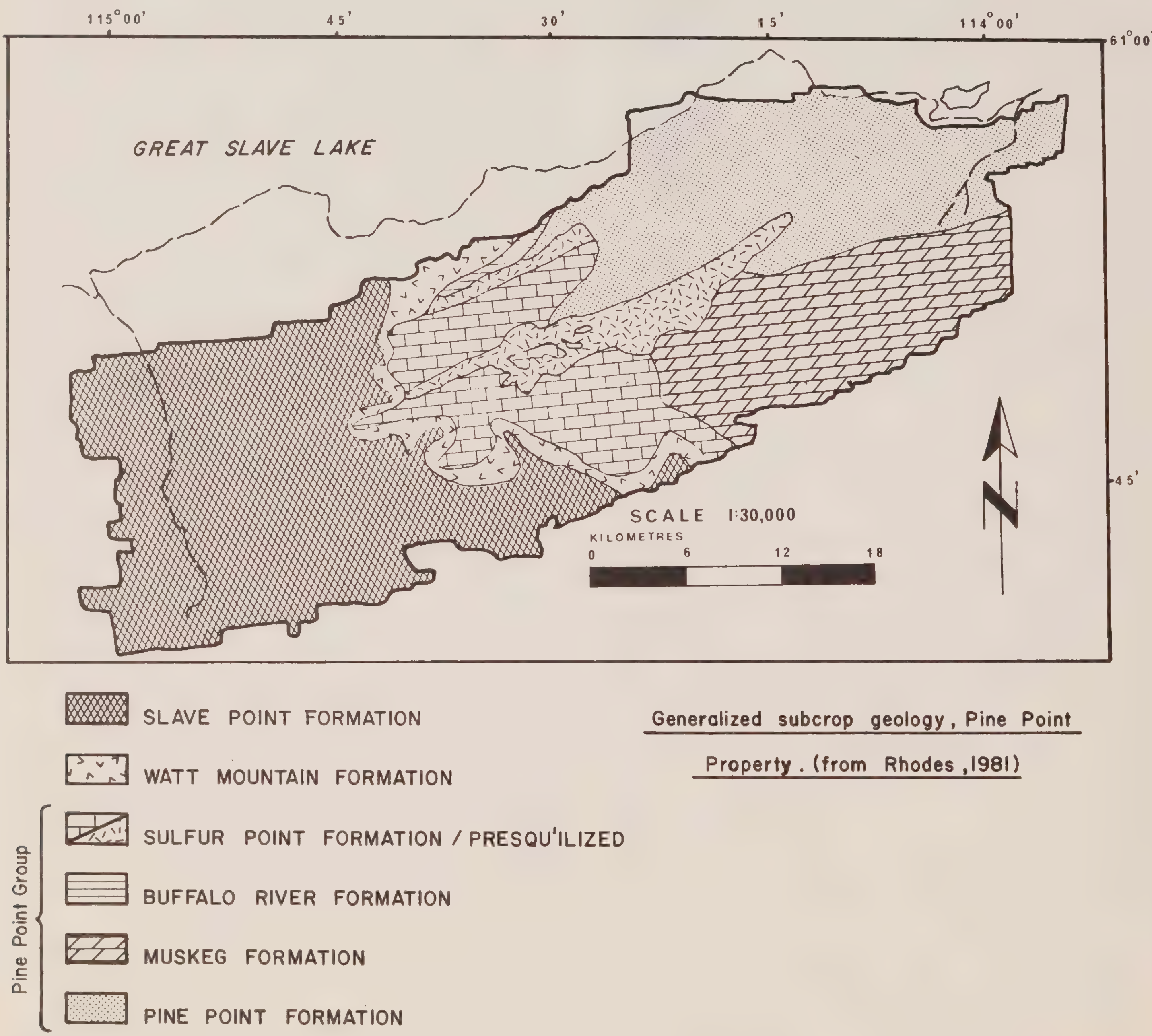


FIGURE 2-21: Generalized subcrop geology, Pine Point Property (from Rhodes, 1981)

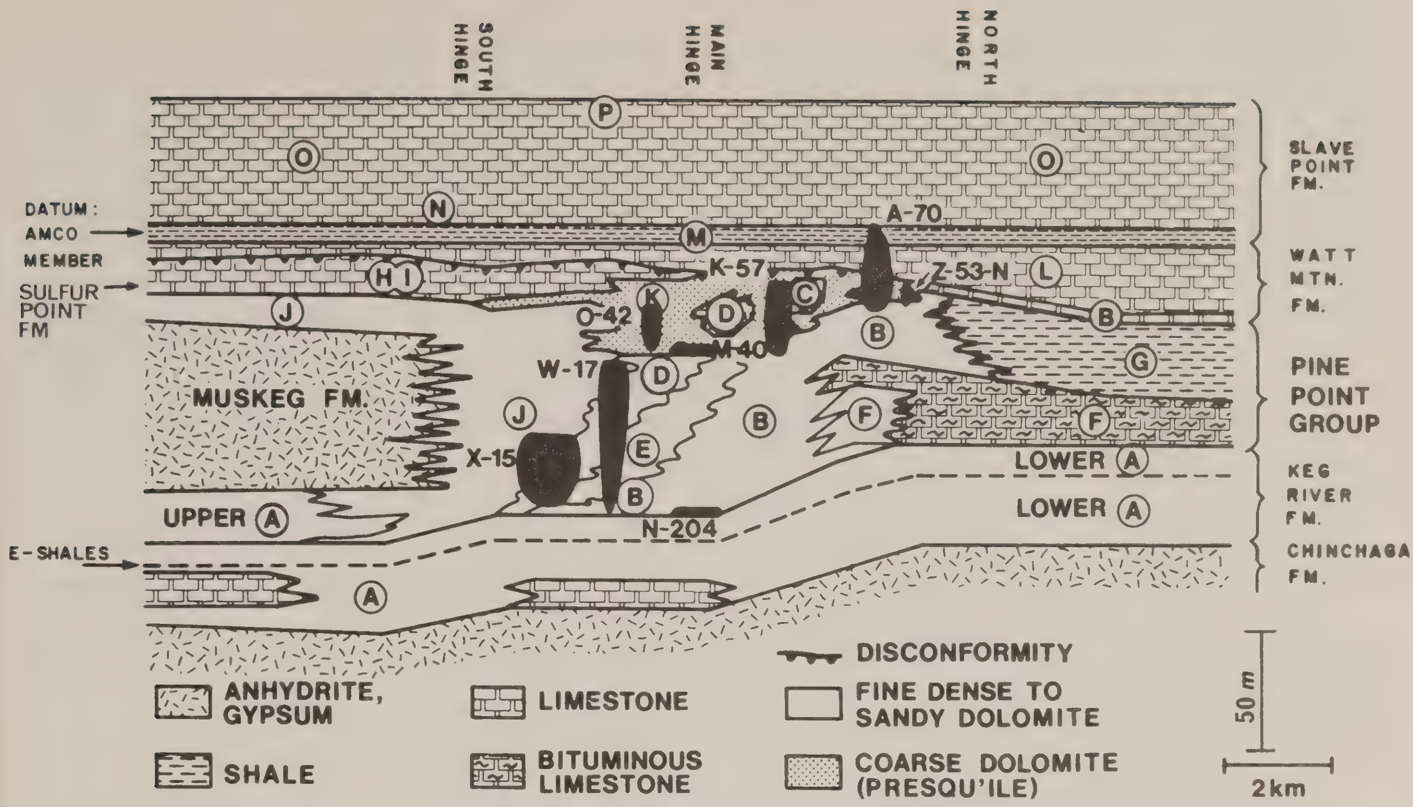


FIGURE 2-22: Schematic west-facing, southeast-northwest section across the Presqu'ile barrier complex on the Pine Point Property, showing facies A through P and approximate locations of the major ore bodies as projected into a single cross section. Highly generalized and modified from Kyle (1980); original facies designations and environmental interpretations from Skall(1975). A- Keg River Formation; dolomite, variably argillaceous (marine platform). B through K- Pine Point Group. B- argillaceous dolomite (off-reef facies); C- micritic limestone (shallow fore-reef facies); D- sucrosic Dolomite, skeletal limestone (organic barrier facies); E- sucrosic dolomite (clean arenite facies); F- micritic, bituminous limestone (deep marine basinal facies); G- calcareous shale (Buffalo River Facies); H and I- micritic limestone (gastropod and Amphipora facies); J- sucrosic dolomite (back-reef facies); K- coarsely crystalline dolomite (Presqu'ile facies); L- Watt Mountain Formation, micritic limestone (green shaly facies); M through P- Slave Point Formation; M- micritic limestone and shale (Amco Member); N- micritic limestone (tidal flat member); O- intraclastic limestone (shallow platform member); P- micritic limestone (deep platform member); (from Macqueen and Powell, 1983).

Jackson and Beales (1967) regard a genetic relation of the ore bodies to basement faults as unwarranted. They postulated that mineralization was a result of normal evolution in a sedimentary basin. Metals were released by weathering of continental rocks and were deposited with basinal shales as absorbed metal ions on clay minerals. Metals were released as soluble metal chloride and organic complexes during compaction and diagenesis. Metal-bearing brines migrated laterally into the permeable reef complex, travelling in the direction of lower hydraulic head. Reduction of sulphate, presumed to be derived from evaporitic strata in the Elk Point Basin to the south of the Pine Point Barrier Reef, resulted in concentration of hydrogen sulphide in more permeable zones of the carbonate complex. Mixing

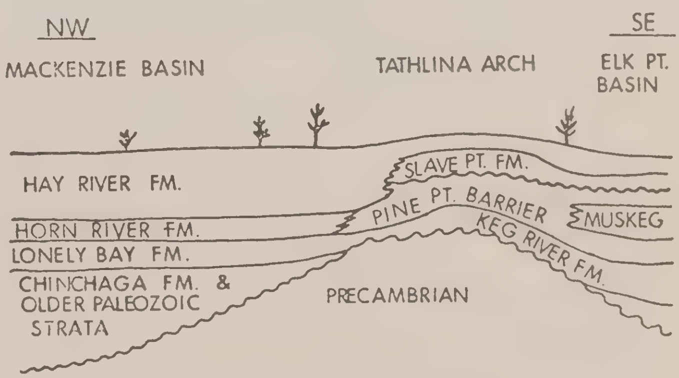


FIGURE 2-23: Generalized and partly schematic geological cross section of Devonian and older strata across the southern margin of the Mackenzie Basin (from Smith and others, 1983)

of metal-bearing brines with reduced sulfur resulted in precipitation of metal sulfides.

The Beales and Jackson hypothesis is supported in more recent studies by Macqueen and others (1975), Smith and others (1983), and Medford and others (1983). The results of these studies can be summarized as follows:

1) Macqueen and others (1983) reported anomalous lead-zinc content in Horn River Formation shales of the Mackenzie Basin (Fig. 2-23), a facies equivalent of part of the Pine Point Formation and thus a source for metalliferous brines.
2) Medford and others (1983) measured $^{87}Sr/^{86}Sr$ ratios of sulfides, carbonates and fluid inclusions from Pine Point to determine if ore-forming fluids introduced strontium from a reservoir other than the Devonian seawater in which the ore carbonates were formed. They reported the presence of gangue minerals having $^{87}Sr/^{86}Sr$ ratios above the range for Devonian marine carbonates, and suggested that this might indicate the former presence of fertile, metal-bearing ore fluids derived from sedimentary rocks of higher Rb/Sr ratio.
3) Smith and others (1983) used electric and sonic logs for 29 oil wells distributed unevenly over a 40,000 km^2 portion of the Mackenzie Basin to construct bulk porosity plots and evaluate the shale compaction history of the Devonian strata. They found that considerable downward dewatering was indicated for the lowest zones (35 m to 100 m) of many of the shale sequences. They calculated that the fluids generated by dewatering could carry at least 20 Mt of metal (Pb+Zn). Their geophysical evidence suggested that migration was not a broad front of movement, but rather a channelled flow through only the most permeable zones in the underlying strata, in this case the carbonate strata of the Lonely Bay Formation, which is underlain by relatively impermeable evaporites of the Chinchaga Formation (Fig. 2-23). The authors recognized a pattern of shale compaction that appears to focus and direct the flow of expelled fluids towards the Pine Point Barrier Reef Complex.

This mounting evidence to support at least a modified version of the Beales and Jackson hypothesis does not discount the role of the basement faults. Reactivation of these faults was probably responsible for initiating the Pine Point Barrier Complex and setting the geological scenario for mineralization. Timing is a problem that remains to be resolved. Kyle (1980) believes that the concept of multiple phases of metal enrichment warrants consideration.

CURRENT WORK AND RESULTS

Development at Pine Point during 1982 and 1983 is summarized in Table 2-18 and an eight-year production and reserves summary from 1976 to 1983 is shown in Table 2-17.

TABLE 2-17: PRODUCTION AND RESERVES, PINE POINT 1976 TO 1983

	PRODUCTION			RESERVES		
Year	milled	kt Zn	Kt Pb	Mt	Grade (Zn,Pb)	
1976	3.42Mt	170	54	32.7	5.4%	2.0%
1977	3.12Mt	156	61	33.6	5.3%	2.1%
1978	2.98Mt	162	74	33.6	5.1%	1.9%
1979	2.99Mt	151	54	34.5	5.0%	1.9%
1980	3.29Mt	171	62	37.2	5.3%	1.9%
1981	3.30Mt	148	64	37.2	5.4%	1.9%
1982	2.22Mt	153	64	31.7	6.1%	2.4%
1983	0.89Mt	68	23	23.6	6.3%	2.7%

TABLE 2-18: DEVELOPMENT, PINE POINT MINES, 1980 TO 1983

Development	1980	1981	1982	1983
Waste Removal (Mt)	14.9	19.7	25.9	12.7
Haulage Roads (km)	14.5	18.0	*N.R.	*N.R.
Expl'n drill (m)	27,432	39,300	43,282	35,052
Definition drill (m)	41,000	47,850	67,970	16,154
Geophysics (line-km-IP)	278	381	431	97
Expl'n Exp'd ($\$X10^6$)	1.9	2.8	3.7	2.4

* N.R. - not reported.

The operating loss incurred by Pine Point Mines in 1982 and 1983 was the first since production began in 1965. Inflation, wage increases and the higher cost of stripping waste were responsible for escalating costs at a time when low prices for lead and zinc resulted in reduced profitability. Measures were taken in 1982 to improve operating performance by reducing production from lower-grade ore sources, placing the concentrator on a five-day week, curtailing operating and capital expenditures,

freezing the salaries of non-union staff and placing a freeze on hiring. Nevertheless, mining continued to be unprofitable and operations were shut down on January 2, 1983. The mine reopened on June 15, 1983, after unionized employees agreed to a 10% pay cut and after financial assistance was given by the federal and territorial governments. In addition, concessions were negotiated for reduced freight rates, smelter charges and power tariffs. Lead and zinc prices improved in the latter part of 1983, and by early 1984 most of the assistance and concessions were discontinued as the mine headed towards profitability.

1982

Mine production was from eleven pits; the high number of production pits reflecting exploitation of smaller, tabular orebodies along the north hinge (Fig. 2-19). Five pits were mined out and three others were being prepared for production at year-end. The tabular X-53 deposit (Fig. 2-19) was the main producer, contributing almost 40% of the annual mill feed.

Further development at the N-81 deposit (Fig. 2-19), which was discovered in 1981, confirmed reserves of 2.7 Mt of ore grading 14% Zn and 7% Pb. Preparation of this deposit for production in 1984 included construction of a haul road and a 3.2-km power transmission line to the pit. A dry facility was completed and a drainage ditch was started. N-81 is the third largest deposit found in the Pine Point camp.

Rising mining costs and higher strip ratios required the removal of some presently uneconomical material from the ore reserves, but 1982 reserves are comparable to 1981 reserves because of new ore outlined in N-81 (Table 2-17).

1983

Mine production came from five operating and two development pits. The X-54 and X-53 deposits were mined out, the latter having provided 50% of concentrate production during the year. The other major contributor was the A-55 deposit, which provided 30% of concentrate production.

Development continued on two tabular orebodies and on the prismatic N-81 deposit. About 45% of the required overburden stripping at N-81 was completed. More than 2400 m of deep-well drilling was completed to enable large-scale pumping to commence at the N-81 orebody and to dewater the lower benches in the A-55 pit.

Table 2-17 shows significantly lower ore reserves at year-end. This is due to the removal from the ore reserve of 8.3 Mt grading 5.5% Zn and 1.4% Pb; this material being mainly underground reserves that are now deemed uneconomical because of rising mining costs. Exploration in 1983 outlined new reserves of 708 kt grading 4.2% Zn and 1.1% Pb in two areas on the property.

NANISIVIK MINE

Nanisivik Mines Ltd.	Zinc, Lead, Silver
#401, 44 Victoria St.	48 C/1
Toronto, Ont., M5C 1Y2	Orebody at:
	73°02'30"N,84°28'30"W

REFERENCES

Blackadar (1956, 1965, 1970); Christie and others (1972); Clayton and Thorpe (1982); Ford (1982); Fish (1979); Geldsetzer (1973a, 1973b); Gibbins (1982); Graf (1974); Iannelli (1979); Jackson and Iannelli (1981); Jackson and others (1975, 1978, 1980); Lemon and Blackadar (1963); Olson (1977, 1984); Yates (1975).

PROPERTY

A claim, FISH 1-12, HB claim, 22 LION claims, LYNK 1-4 (Mining Leases 2274-2275, 2451-2453 and 2799-2804 covering about 54 sq. km).

LOCATION

The Nanisivik mine is south of Strathcona Sound on Borden Peninsula, northwestern Baffin Island. It is 27 km east of the community of Arctic Bay and is serviced twice a week by commercial jet flights from Montreal, 2000 km to the south. A marine wharf, just north of the mill on Strathcona Sound, accommodates ocean-going ships that carry concentrates to smelters during the short shipping season.

HISTORY

Galena, sphalerite and other sulfides were originally found at Strathcona Sound by A. English, a prospector who accompanied a Dominion Government Expedition to the Arctic Islands in 1910. Four claims were staked in the area by prospectors J. Tibbit and F. McInnes in 1937, but assessment work was not done and the claims lapsed. A report on the geology of the Strathcona Sound area by R.G. Blackadar (1956) included a description of an extensive pyrite zone containing minor galena and sphalerite. This report

prompted geologists from Texas Gulf Sulfur Co Ltd (TGS) to investigate the area, and in 1957 fifteen claims were staked to partly cover what proved to be the eastern end of the main orebody (Main Lens). Work done by TGS between 1958 and 1969 included 30,500 m of diamond drilling, bulk sampling from an adit driven into the east end of the orebody, geophysical surveying and additional claim staking. In 1972 an option on the Strathcona Sound property was negotiated with Mineral Resources International. Watts, Griffis and McOuat Ltd, commissioned to do a feasibility study, recommended that the property be brought to production. Financing was arranged through agreements with TGS (now Kidd Creek Mines), Metallgesellschaft AG, Billiton BV and various banks. A development agreement was negotiated whereby the Government of Canada would obtain an 18% interest in the project for supplying infrastructure. In 1974 Strathcona Mineral Services was contracted to manage the project and Nanisivik Mines Ltd was formed to operate the mine. Two adits and a connecting ramp were driven into the west end of the orebody and a concentrator, central power plant and underground crushing plant were completed in September, 1976, when production began at a rate of 1,420 tpd. Preproduction costs, excluding property acquisition and exploration, amounted to about $51 million.

In recent years exploration has focused on three principal targets: The Lower Lens sulfide zone, which is several decameters beneath the Main Lens; the North Zone, immediately north and below the Main Lens; and Area 14, five km to the southeast. By 1981, potential reserves in the Lower Zone were deemed sufficient to warrant underground development, and a ramp was laid out to provide access to it and to the nearby North Zone. In Area 14, drilling outlined a 1/2-km-long, 10-m to 20-m-thick sulfide deposit containing ore-grade material along a 250-m strike segment. About 125 kt of ore has also been outlined in the Shale Hill Area, several hundred meters north of the Main Lens. Several massive sulfide deposits consisting mainly of pyrite have also been evaluated in the mine area by drilling and by a variety of geophysical surveys including reflection EM (radar), VLF-EM, Turam, pulse EM and magnetometer.

Nanisivik Mines Ltd is now owned: 53% by Mineral Resources International, 18% by Government of Canada, 11.25% by Billiton BV, and 6.25% by Kidd Creek Mines Ltd.

DESCRIPTION

Nanisivik is within the Arctic Platform on Borden Peninsula, northwestern Baffin Island. Most of Baffin Island is underlain by Aphebian-Archean crystalline gneiss of the Churchill Province, but on Borden Peninsula a depression in this basement, Borden Basin (Christie and others, 1972), is mainly filled by Neohelikian sedimentary rocks of the Bylot Supergroup (Jackson and Iannelli, 1981). The basic formational nomenclature of the Bylot Supergroup (Table 2-19), which is subdivided in ascending order into the Eqalulik, Uluksan and Nunatsiaq Groups, was established by Lemon and Blackadar (1963) and Blackadar (1970). The Bylot Supergroup is cut by Franklin diabase dikes and is overlain unconformably by Paleozoic to Eocene strata (Fig. 2-24).

TABLE 2-19: TABLE OF FORMATIONS, BORDEN BASIN (from Jackson and Iannelli, 1981)

HADRYNIAN			Franklin Intrusions: Diabase	
		GP	Intrusive Contact	
NEOHELIKIAN	BYLOT SUPERGROUP	NUNATSIAQ	Elwin Fm. (470-1220 m):	EL_1: Quartzarenite, siltstone EL_2: Sandstone, siltstone, dolostone
			Gradational	
			Strathcona Sound Fm: (430-910 m+)	SS_6: SS_{1-5} lithologies interbedded SS_5: Polymictic conglomerate SS_4: Siltstone, greywacke SS_3: Arkose-greywacke, shale SS_2: Dolostone, dolostone conglomerate SS_1: Shale, siltstone
			Gradational	
			Athole Point Fm: (0-585 m) Limestone, sandstone, shale	
			Gradational	Gradational to Unconformable
		ULUKSAN	Victor Bay Fm: (156-735 m)	VB_2: Limestone, dolostone, flat pebble conglomerate VB_1: Shale, siltstone, sandstone, limestone
			Conformable, Abrupt to Gradational	
			Society Cliffs Fm: (263-856 m)	SC_2: Stromatolitic & massive dolostones SC_1: Stromatolitic dolostone, shale, sandstone, gypsum
			Chiefly Unconformable?	Gradational to Unconformable
		EQALULIK	Fabricius Fiord Fm: (400-2000 m+) FF_4: Arkose, conglomerate, dolostone FF_3: Subarkose, conglomerate FF_2: Shale, quartzarenite FF_1: Quartzarenite, shale	Arctic Bay Fm: (180-770 m) AB_4: Shale, dolostone AB_3: Shale, siltstone AB_2: Shale, quartzarenite AB_1: Siltstone, quartzarenite
			Conformable, Abrupt to Gradational	
			Adams Sound Fm: (0-610 m) AS_3: Quartzarenite, conglomerate, shale AS_2: Quartzarenite AS_1: Quartzarenite, conglomerate	AS_U: Quartzarenite AS_L: Quartzarenite, conglomerate
			Conformable	
			Nauyat Fm: (0-430 m)	NA_2: Plateau basalt NA_1: Quartzarenite, subarkose, basalt
			Nonconformity	
ARCHEAN-APHEBIAN			Granitic gneiss basement complex: Migmatite, foliated granitic rocks, granite, charnockite, supracrustal relics	

Borden Basin evolved within the North Baffin Rift Zone (Jackson and others, 1975) and probably developed along a failed arm or aulacogen during Neohelikian (1.2 Ga) ocean opening to the northwest (Olson, 1977). Faulting took place throughout

deposition of the Bylot Supergroup; episodic vertical movements along steep, west-to northwest-trending faults gave rise to horsts and grabens. Less widespread and relatively local northerly trending faulting also occurred (Jackson and Iannelli, 1981).

The Nanisivik area is on a major, west-northwest-trending graben, the long axis of which underlies and parallels Strathcona Sound (Clayton and Thorpe, 1982). The Nanisivik ore deposits are in an area where subsidiary horsts and grabens have been superposed on this major structure; the Main Lens is exposed on a hill that coincides with one of these subsidiary horsts (Fig. 2-25b).

The geology at surface is relatively simple. Dolomite of the Society Cliffs Formation, the lowermost formation of the Uluksan Group, underlies most of the area between Strathcona Sound and the South Boundary Fault (Fig. 2-25a). Locally the dolomite is overlain by shales of the Victor Bay Formation (Table 2-19) and cut by Franklin diabase dykes (Clayton and Thorpe, 1982). One of these dykes cuts across the orebody (Fig. 2-25b), which proves that mineralization is pre-Hadrynian. The deposit is in the upper part of the Society Cliffs Formation, which consists of slightly metamorphosed, algal-laminated, brown-weathering, light-grey to black dolostone that commonly emits a petroliferous odour when broken and contains sparsely-disseminated blebs of bituminous material (Jackson and Iannelli, 1981). Most of the formation has undergone recrystallization and has been extensively brecciated; mosaic, crackle and rubble breccia are common. The cause of the brecciation is not clear, but it probably results from collapse (Clayton and Thorpe, 1982). Breccias near the upper contact of the Society Cliffs Formation do not contain Victor Bay material, implying that collapse took place before deposition of Victor Bay Formation sediments. Geldsetzer (1973b) cites this as evidence of a hiatus between deposition of the Society Cliffs and Victor Bay Formations. The strata in the mine area, where relatively undisturbed by faulting, strike easterly

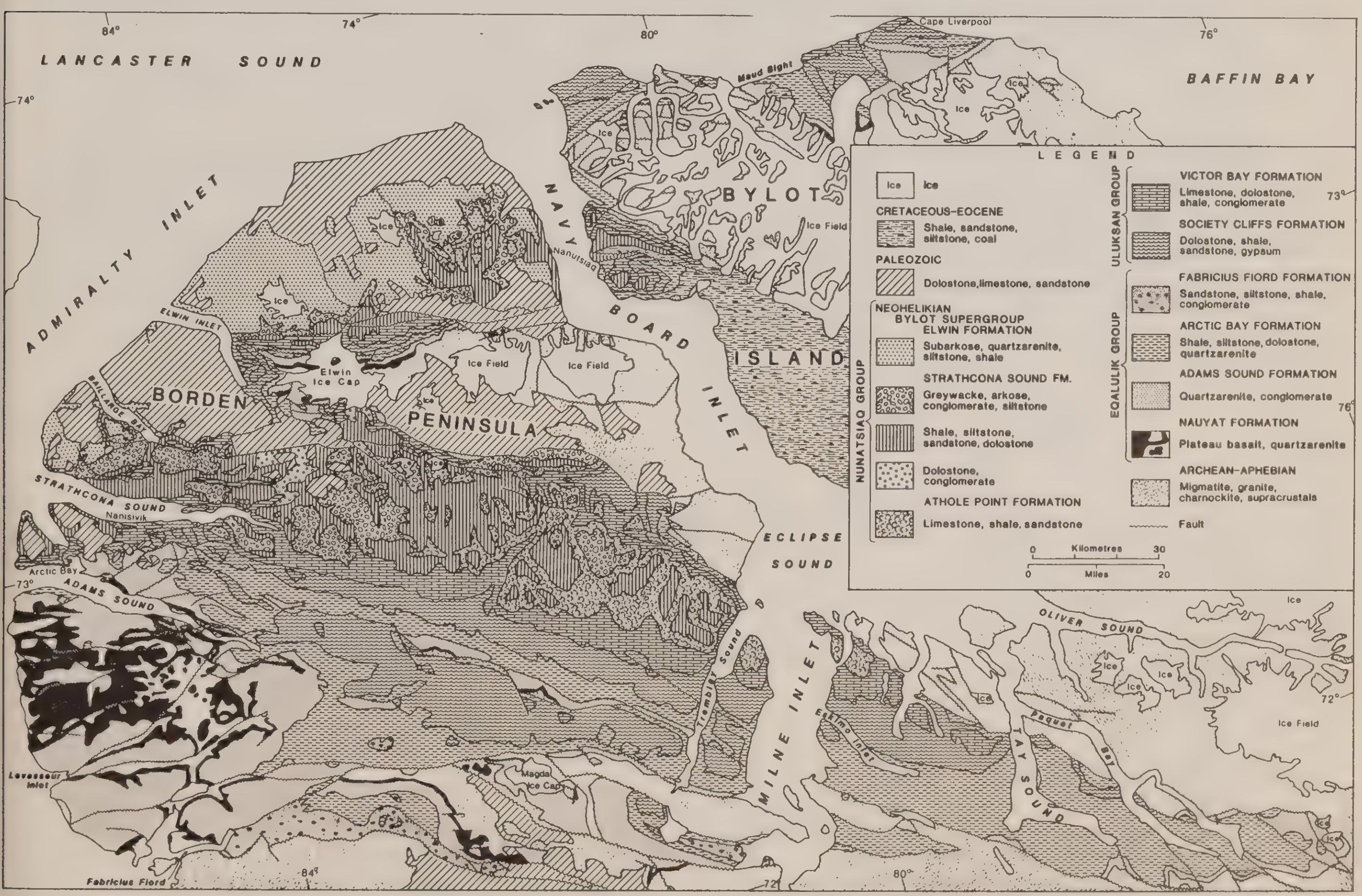
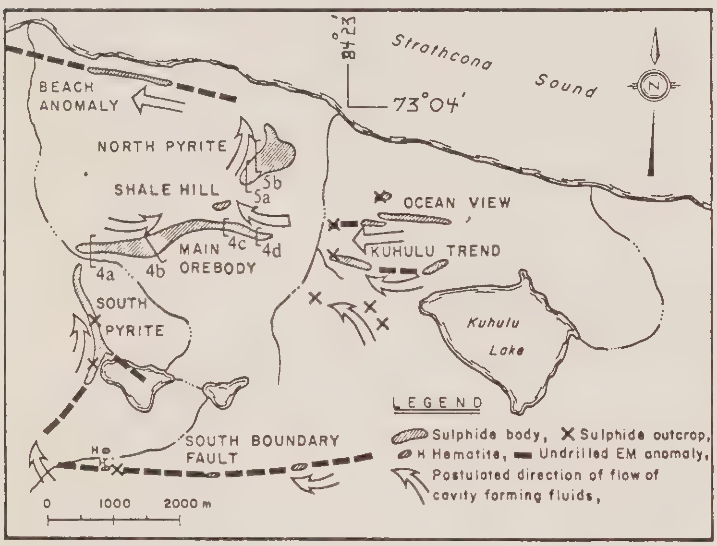


FIGURE 2-24: Regional geology, Borden Basin. Nanisivik is shown south of Strathcona Sound at about 73°N latitude and 85°W longtitude (from Jackson and Iannelli, 1981)

and dip gently to the north.

Nanisivik's main orebody, the Main Lens, is one of many massive sulfide deposits that have been found within a 5-km radius of the mill site (Fig. 2-25a), but few others contain economic concentrations of lead and zinc. The massive sulfide bodies, which are mainly pyrite, occupy cavities that resemble water-table caves in the Society Cliffs dolostone (Clayton and Thorpe, 1982), but the recent discovery of a 10-Mt pyrite deposit in the hangingwall of the South Boundary Fault (Fig. 2-25) indicates that massive sulfides are also fault related.

The Main Lens is a tabular, horizontal orebody outcropping on the slopes of a prominent hill that forms the topographic expression of the horst that hosts the deposit. In plan, the 2-m to 30-m thick



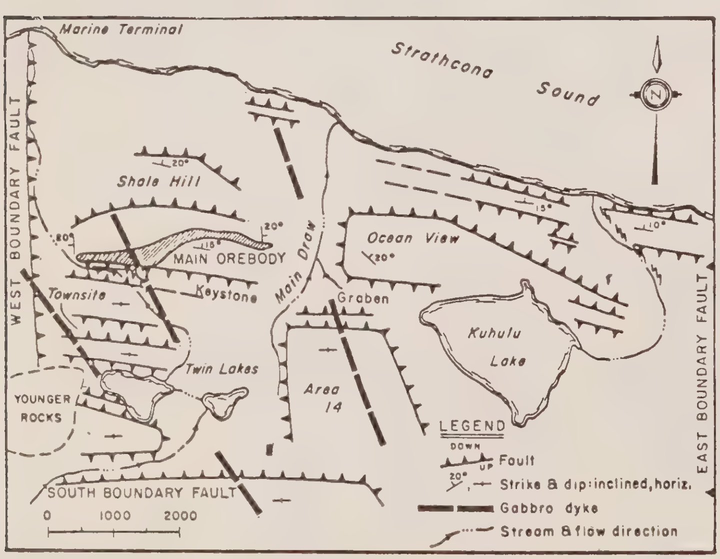


FIGURE 2-25a (above): Sulphide bodies, Nanisivik
2-25b (below): Block faulting, Nanisivik
(from Clayton and Thorpe, 1982)

Main Lens is about 100 m wide and about 3 km long (Fig. 2-25a). The southern part of the Main Lens is cut by a fault that displaces strata by about 120 m, but only displaces the orebody by a meter or two (Fig. 2-26).

The Lower Lens is about 20 m below the Main Lens and is probably connected to it by a narrow, subvertical keel sulfide zone(s) (Fig. 2-26). The Lower Lens is neither as continuous as the Main Lens nor as well mineralized. Recently, drilling has confirmed the presence of a third lens at slightly lower elevation than the Lower Lens. It now appears that there are many pods, lenses and stringers of sulfides at various stratigraphic levels below the Main Lens. These include the North Zone, which is immediately north and just below the western part of the Main Lens, and the Shale Hill Zone, which is several hundred meters north of the Main Lens. In 1981, drilling indicated geological reserves of 100 kt grading 16% Zn and 3% Pb in Area 14 (Fig. 2-25b), the only significant ore-bearing massive sulfide deposit found on the property that is not adjacent to the Main Lens.

The following description of Nanisivik ore is from Gibbins (1983).

> Typical ore consists of euhedral to subhedral grains of sphalerite and galena with anhedral pyrite, sparry dolomite and ice as gangue. Sulphide ore is normally well bedded, commonly with cut and fill and onlap features. Massive pyrite and very-coarse-grained sulfide breccias are locally developed. Both pyrite and sphalerite stalactites are present, but very rare. Long, horizontal fins of host rock dolomite and related corrosion features are common in the mine workings of the Main Lens. Ford (1982) estimated

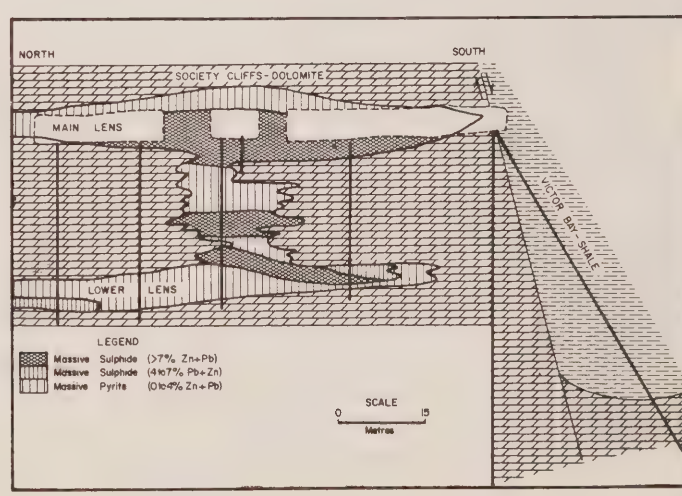


FIGURE 2-26: Generalized cross section of the Nanisivik deposit (from Gibbins, 1982)

at least 95% of the volume of the main ore cavity was created by ore fluids dissolving dolomite as sulfides were emplaced .

The sulfide bodies at Nanisivik pass through some major faults with little or no change in elevation, implying that their emplacement was not stratigraphically controlled. Nor does the emplacement of sulfide bodies appear to be related to brecciation; there are many places where sulfides end in brecciated algal dolomite. The distribution of sulfides strongly suggests a system in which the drainage was along the faults until "meeting a sinkhole resulted in a breakthrough northwards towards the Sound and deposition of sulfides in the cavities" (Clayton and Thorpe, 1982).

Olson (1977), in presenting fluid inclusion data from sphalerite at Nanisivik, gave 100°C as the average temperature from six inclusions. Temperatures from inclusions in sparry dolomite and sulfur isotope fractionation studies are generally higher, the highest average being about 200°C. Clayton and Thorpe (1982) consider this as evidence of two separate processes; the cavities being formed as horizontal caves by meteoric waters at low temperature and pressure, and the minerals being deposited at elevated temperature and pressure, ie., at greater depth and under Victor Bay cover. They suggest that mineralized fluids evolved from connate water from the Arctic Bay or Adams Sound Formations; they further suggest that the cavities could have remained open for a short time under Victor Bay cover and that the meteoric and connate waters were contemporaneous, or nearly so.

CURRENT WORK AND RESULTS

Production and reserves at Nanisivik from 1977 to 1983 are listed in Table 2-20, and a summary of mine development during 1982 and 1983 is given in Table 2-21. Most of the underground development was done to test the Lower Lens. A decline was driven through the North Zone to a segment of the Lower Lens beneath the center of the Main Lens. Drilling of this zone, the North 17 Zone, indicated geological reserves of 1.0 Mt of ore grading 13% Zn (Pb is rarely found in the Lower Lens). A ramp was also driven to a segment of the Lower Lens beneath the eastern part of the Main Lens, where drilling indicated potential for 0.5 Mt of ore. Some ore was mined from the Lower Lens during 1983.

TABLE 2-20: PRODUCTION AND RESERVES, NANISIVIK MINE 1977 TO 1983

	PRODUCTION			RESERVES		
YEAR	kt milled	kt Zn	Kt Pb	kt	% Zn	% Pb
1977	525	68	10.8	6350	13.2	1.4
1978	575	73	7.2	5300	11.6	1.3
1979	615	76	7.6	3250	11.9	1.2
1980	435	64	10.3	3250	12.0	1.1
1981	624	68	8.3	3580	10.3	0.8
1982	622	75	9.4	4400	11.0	1.5
1983	628	61	6.4	3800	10.1	0.8

TABLE 2-21: DEVELOPMENT, NANISIVIK, 1982 TO 1983

YEAR	Lateral Dev.	Raising	Surface Drilling	Underground Drilling
1982	1721 m		688 m	5007 m
1983	977 m	56 m	440 m	6862 m

SOURCE: Mining Inspection Service, Gov't of the NWT, does not include drilling at Area 14.

Exploration in Area 14, five km southeast of the mill, established probable reserves of 350,000 t of ore grading 15% combined lead and zinc. The improved ore-reserve situation in 1982 (Table 2-20) reflects the tonnage added from Area 14 as well as additional reserves moved from the possible to the probable category in the Main Lens and the Lower Lens. Mining of Area 14 is planned in 1984.

POLARIS MINE

Cominco Ltd.	Zinc, Lead
Northern Group,	68 H/8
Precambrian Building,	Deposit at:
Yellowknife, NWT	75°23'42"N,96°56'00"W

REFERENCES

Gibbins (1982, 1983); Jowett (1975); Kerr (1977a, 1977b); Kerr and Christie (1965); Muraro (1973), Scales (1982); Thorsteinsson (1958, 1973); Thorsteinsson and Kerr (1968).

PROPERTY

POLARIS 1-21 claims (Mining Lease 2346 covering 396 ha). Cominco also controls other mining leases that cover most of Little Cornwallis Island and all of Truro Island to the southwest (Fig. 2-28).

LOCATION

The Polaris Mine is at the southwest extremity of Little Cornwallis Island, 1700 km north-northeast of Yellowknife and 100 km north-northeast of Resolute on Cornwallis Island. Supplies and personnel are flown to an airstrip at the mine site from Resolute, which is regularly serviced by commercial flights from Montreal/Frobisher Bay (Nordair) and Edmonton/ Yellowknife (Pacific Western Airlines). Borek Air and Bradley Air Services operate Twin Otters from a base in Resolute. A wharf on Crozier Strait at the mine site accommodates ocean-going ships that carry non-perishable supplies to the mine and concentrates to smelters.

HISTORY

Geological Survey of Canada field parties headed by Thorsteinsson and Fortier in 1950 and by Thorsteinsson during the succeeding three years were the first to undertake a systematic geological reconnaissance of the Cornwallis Islands (Thorsteinsson, 1958). More detailed stratigraphic and mapping studies were carried out by Thorsteinsson and Kerr (1968), and a 1:125,000-scale geological map of the McDougall Sound area (NTS 68H) was produced by Thorsteinsson (1973, G.S.C. Open File 139). Regional studies of the Cornwallis Fold Belt were done by Kerr and Christie (1965) and Kerr (1977a). Brief descriptions of the Polaris deposit and other deposits of the Cornwallis Lead-Zinc District were given by Kerr (1977b) and Gibbins (1982, 1983). Ore-forming fluids at Polaris were the subject of a fluid-inclusion study by Jowett (1975).

Geologists mapping oil permits for Bakenko Mines Ltd discovered galena and sphalerite on Little Cornwallis Island in 1960. Between 1961 and 1963, Bakenko drilled and staked ground covering the Polaris deposit and the Eclipse showings (Fig.2-28). The claims were optioned to Cominco in 1964, and geological mapping, surface diamond drilling and geochemical surveying were carried out between 1964 and 1966. A geophysical survey in 1970 detected a coincident gravity and IP anomaly. The anomaly was drilled in 1971, and 16 Mt of ore grading 20% combined lead-zinc was outlined. A new company, Arvik Mines Ltd, was formed to develop the Little Cornwallis properties. Encouraging results from further drilling in 1972 led to underground development in 1972-73 to obtain a bulk sample and to confirm continuity of the orebody and viability of mining in permafrost. Extensive underground drilling established reserves estimated at 23.0 Mt grading 14.1% zinc and 4.3% lead. After feasibility studies in 1979, Cominco and Bakenko decided to dissolve Arvik Mines and bring the Polaris deposit to production. The orebody was turned over to Cominco under an agreement in which Bakenko Mines retained an option on a royalty interest.

Construction of mine facilities (extended airstrip, wharf, concentrate storage buildings, accommodation complex, tailings disposal system and fresh-water supply system) was completed during 1980 and 1981. A service decline (15% grade) was driven parallel to the original exploration decline (20% grade) into the shallowest part of the orebody (the Panhandle Zone). In 1981 the mill and office complex, which was constructed at Trois Rivières in Quebec, was erected on a barge and floated to the mine site. First ore was fed into the mill on November 4, 1981.

Polaris, the most northerly metal mine in the world and the eleventh-largest zinc-lead producer (Northern Miner, Nov. 8, 1979), is designed to produce 170 kt of zinc concentrate and 38 kt of lead concentrate annually (Cominco Annual Report, 1980).

DESCRIPTION

The Polaris deposit is in the Cornwallis Fold Belt, a north-trending, north-plunging anticlinorium more than 650 km long that extends from the Precambrian Shield to the Sverdrup Basin (Kerr, 1977a; also see Fig. 2-27). The Cornwallis Fold Belt

was formed mainly in response to the Cornwallis Disturbance (Kerr, 1977a), which involved four main pulses of differential vertical uplift during the Silurian and Devonian (Table 2-22). The uplift originated in the Precambrian crystalline basement along vertical fault zones that define the Boothia Horst (Fig. 2-27). These faults extend into the overlying Paleozoic sediments of the Cornwallis Fold Belt, changing gradually upward from vertical faults to high-angle reverse faults to overturned anticlines to asymmetric anticlines (Kerr, 1977a). The basic structure of the fold belt was modified by other types of deformation from Late Devonian to present; notably by block faulting during the Cretaceous-Tertiary Eurekan Rifting Episode.

The Polaris deposit is one of a number of zinc-lead deposits in the Cornwallis Lead-Zinc District (Fig. 2-28) that have similar geological settings and controls on mineralization. A reconstructed geological cross section through the Truro Island and Polaris deposits (Fig. 2-29) illustrates four controls on mineralization recognised by Kerr (1977b).

1) Deposits are stratabound within carbonates of the Ordovician Thumb Mountain Formation.
2) Ore is in brecciated dolostone, in contrast to the usual limestone of the Thumb Mountain Formation.

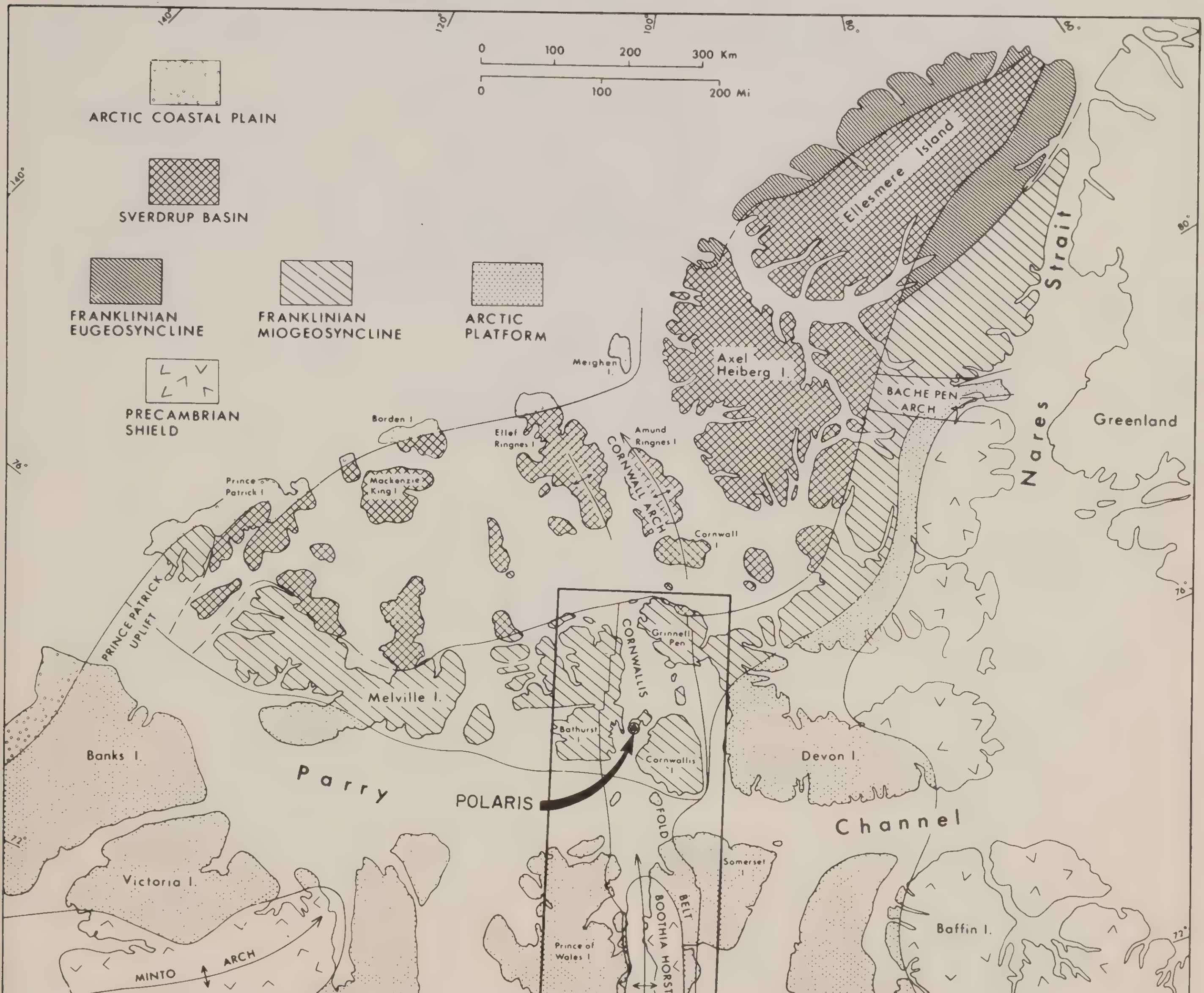


FIGURE 2-27: Regional geology of the Canadian Arctic Islands (from Kerr, 1977a). The north part of the Cornwallis Fold Belt (blocked-out area) is enlarged in Figure 2-28

TABLE 2-22: TABLE OF FORMATIONS AND TECTONIC EVENTS, CORNWALLIS FOLD BELT (from Kerr, 1977b)

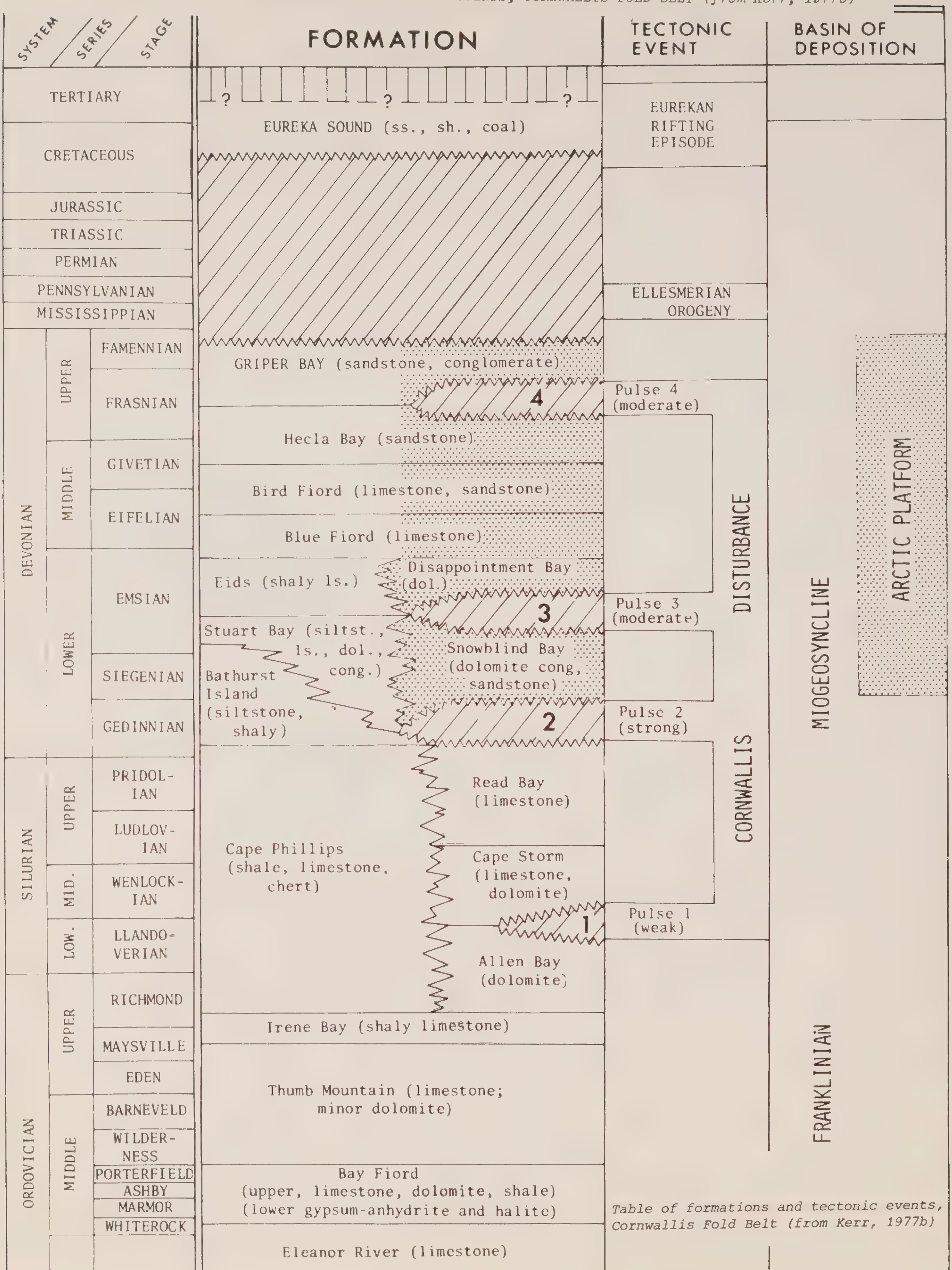


Table of formations and tectonic events, Cornwallis Fold Belt (from Kerr, 1977b)

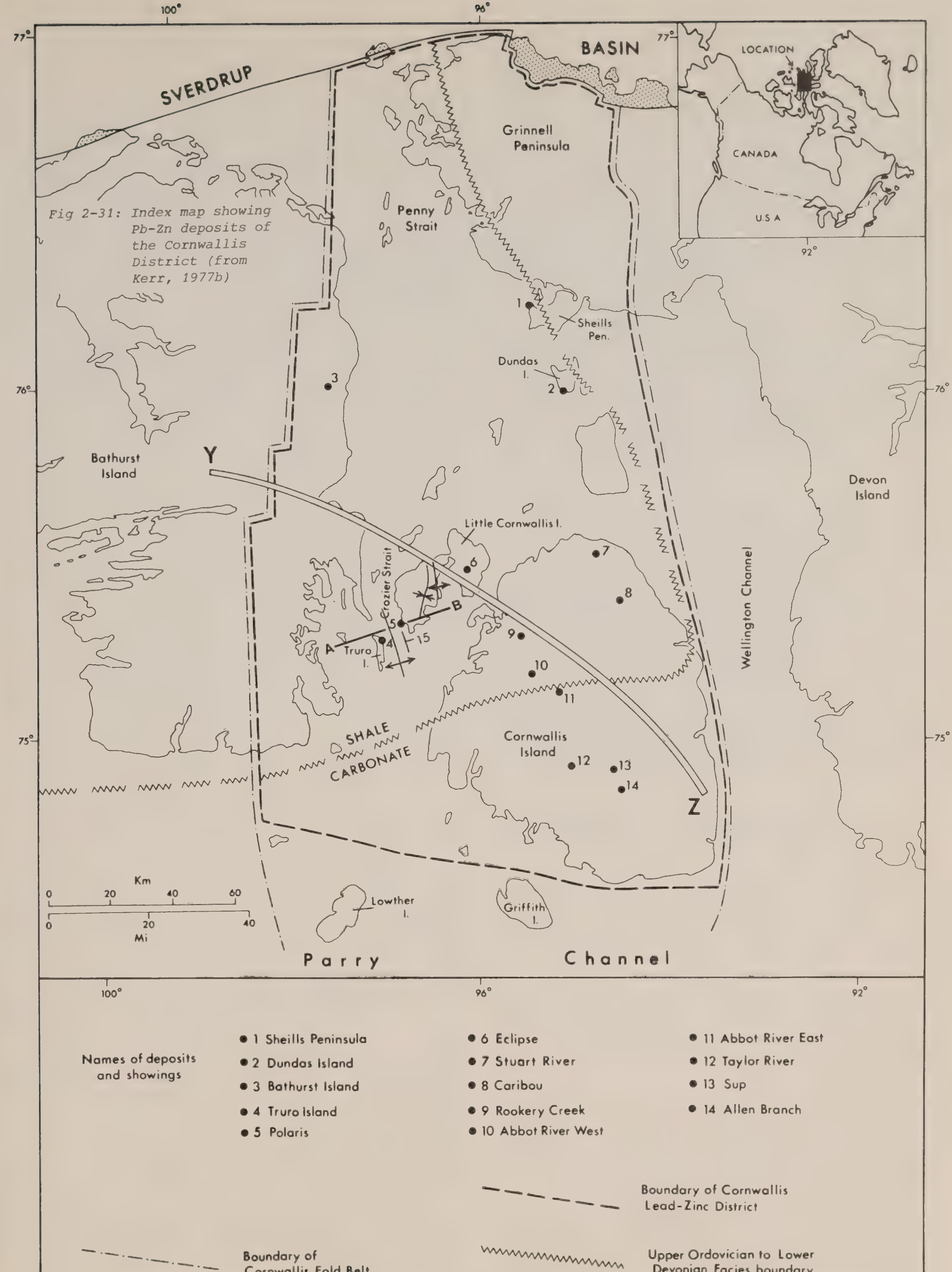


FIGURE 2-28: Index map showing lead-zinc deposits of the Cornwallis District. YZ is the approximate section of Table 2-22. AB is the approximate section of Figure 2-29 (from Kerr, 1977b)

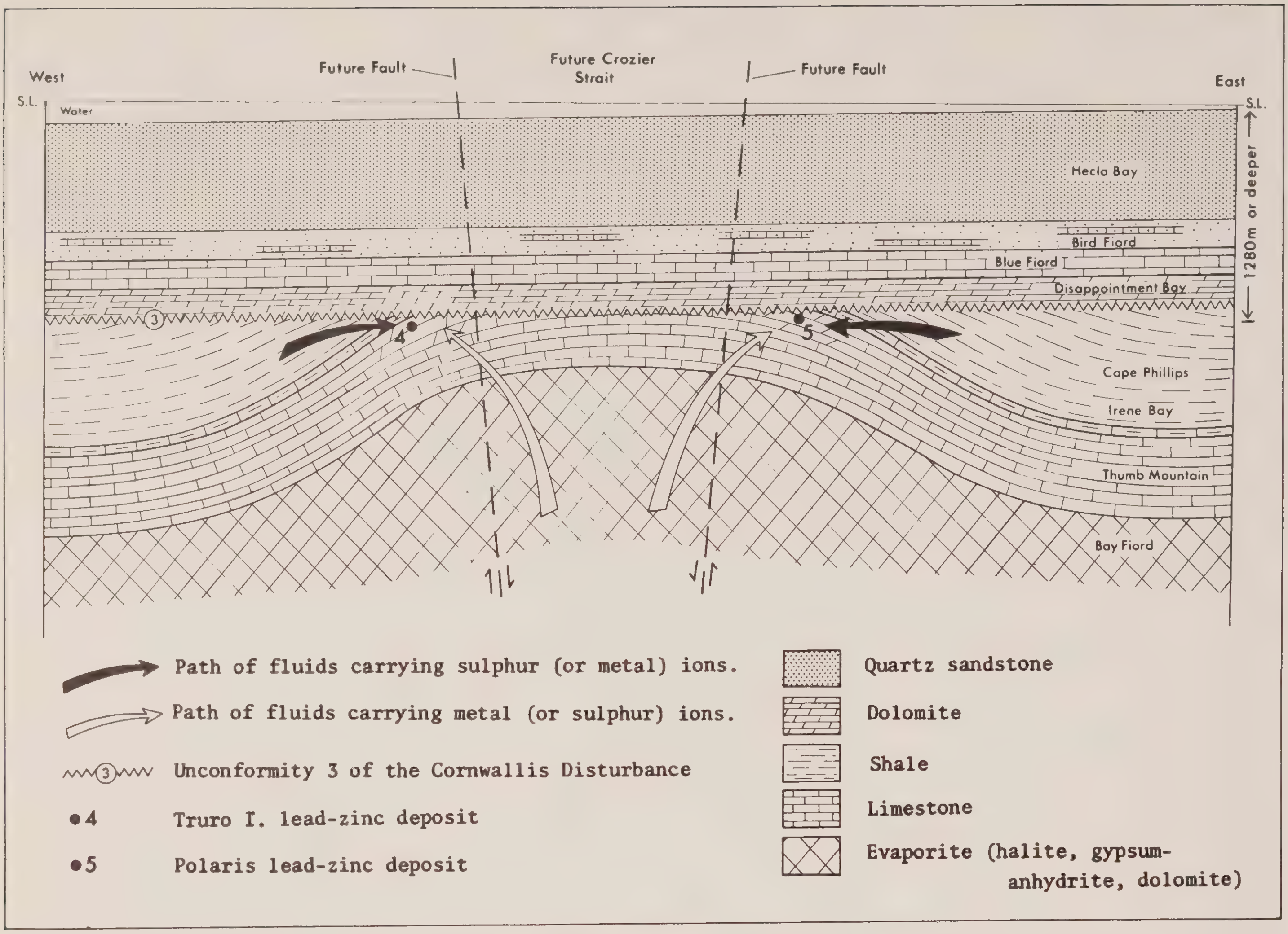


FIGURE 2-29: Reconstructed section along AB of Figure 2-28 showing the stratigraphic position of the Truro Island and Polaris deposits (from Kerr, 1977b)

3) Deposits are close to shale of the Cape Phillips Formation, which may have been the source rock for metals.
4) The hosting Thumb Mountain Formation was subject to erosion and karstification in early Devonian time during Pulse 3 of the Cornwallis Disturbance.

An eight-stage sequence of stratigraphic and tectonic events leading to mineralization was suggested by Kerr (1977b):

1) An Ordovician to Lower Devonian geosynclinal sequence was deposited, containing formations that could be a source of Zn, Pb, Fe, and S, as well as a potential host formation.
2) The sequence was folded by three pulses of the Cornwallis Disturbance.
3) Uplift in Early Devonian time allowed deep

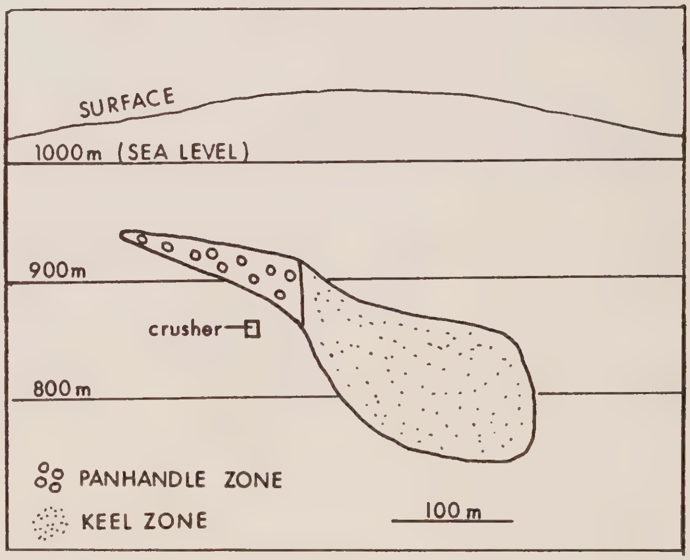


FIGURE 2-30: North-facing cross section showing the shape of the Polaris deposit, Panhandle Zone and Keel Zone (from Cominco information brochure 'Welcome to Polaris')

erosion that exposed the host Thumb Mountain Formation in anticlinal culminations.

4) Caverns and pores developed in the upper part of that formation by karst-type solution.
5) During subsidence an unconformable sedimentary cover buried the host formation and its caverns to a considerable depth.
6) Two formation fluids developed, with metal ions in one and sulphur ions in the other.
7) These two brines migrated laterally and upward, and met in cavities in the Thumb Mountain Formation.
8) In these cavities temperatures and other conditions were suitable and the brines precipitated galena, sphalerite, and pyrite.

The Polaris deposit is on the western limb of a broad, north-trending syncline and is in the upper approximately 75 m of dolomitized Thumb Mountain Formation carbonates. The Thumb Mountain Formation is about 520 m thick at Polaris and the upper mineralized zone is characterized by abundant thin-shelled fossil debris. The Thumb Mountain Formation is overlain successively by about 61 m of nodular limestone and green shale of the Irene Bay Formation and by dark-coloured silty calcareous shale of the Cape Phillips Formation, which is only partly preserved beneath an unconformity (Fig 2-29). Strata strike north-northwesterly and dip 8^{0} to 15^{0} east.

The Polaris deposit is about 350 m long in a northwesterly direction and about 150 m wide. In cross-section (Fig 2-30), the deposit is pan-shaped and comprises the upper Panhandle Zone, about 5 to 40 m thick and beginning about 100 m below surface (50 m below sea level), and the lower Keel Zone, about 100 m thick and beginning about 200 m below surface (125 m below sea level). The Panhandle Zone contains about 4 Mt of ore and the Keel Zone about 21 Mt. Ore grade is about 14% Zn and 4% Pb (Cominco public information circular, "Welcome to Polaris").

Sulfides in the Polaris deposit include sphalerite, galena and about 5-10% pyrite or marcasite. Sphalerite is colloform except where it has crystallized to partly fill vugs in massive sections of sulfide. Galena is medium to coarse grained; iron sulfides are mainly fine grained (Muraro, 1973). The entire orebody is estimated to have a porosity of about 5% (Scales, 1982). Voids are filled with fresh-water ice, so the deposit must be exploited by dry mining techniques at sub-zero temperatures or the ground conditions will deteriorate.

Muraro (1973) considers that the sulfide minerals at Polaris were introduced into space developed in the host formation by solution and brecciation. He was the first to compare Polaris to Mississippi Valley-type deposits. Jowett (1975), who studied fluid inclusions in sphalerite from Polaris, also compared Polaris to Mississippi Valley-type deposits in general and to the Pine Point deposits in particular. He found that fluid inclusions homogenized in the range of 52^{0} to 105^{0} C and suggested that the ore-forming fluids were warm and slow-moving brines, probably highly saline and dense. Kerr (1977b) calculated the minimum temperature of formation at 52^{0}C.

CURRENT WORK AND RESULTS

Although the mill began processing ore in November of 1981, Polaris' first full year of production at commercial rates was 1983. Production and reserves for 1981 to 1983 are listed in Table 2-23, and mine development during 1982 and 1983 is summarized in Table 2-24. Operations at Polaris were routine during the years under review. Mill throughput and feed grades in 1983 were higher than forecast. Diamond drilling in 1983 upgraded 7.6 Mt of ore from the possible class to the proven and probable class of reserves.

TABLE 2-23: PRODUCTION AND RESERVES, POLARIS MINE 1981 TO 1983

PRODUCTION				RESERVES	
Year	kt Mined	kt Zn	kt Pb	kt Reserves	Grade: % Zn, Pb
1981	25.8	3.4	1.1		
1982	470.0	74.0	30.2	9,980	15.2%, 4.4%
1983	829.0	132.2	38.9	16,870	14.8%, 4.1%

NOTE: Production and reserves from Cominco annual reports. Production figures differ from those compiled by the Mining Inspection Service, Government of the NWT (Table 2-1).

TABLE 2-24: DEVELOPMENT, POLARIS MINE 1982 TO 1983

Year	Lateral Dev. (m)	Raising (m)	Slashing (m^3)	Surf Drilling (m)	UG Drilling (m)
1982	2845	124	49595	6877	2519
1983	2327	27	183642	5413	6741

SOURCE: Mining Inspection Service, Government of the NWT.

TUNGSTEN: CANTUNG

INTRODUCTION

The Cantung Mine is in one of the W-Cu (Zn) skarns along the eastern margin of the Selwyn Basin, a miogeoclinal wedge of mainly clastic, Mississippian to Proterozoic sedimentary rocks formed along the western margin of the North American craton. The Selwyn Basin is separated from facies-equivalent platformal carbonates of the Eastern Marginal Belt by a major tectonic flexure, the Redstone Arch (Fig. 2-31). Skarn deposits are associated with Upper Cretaceous quartz monzonite stocks and batholiths that intrude the Selwyn Basin. The W-Cu (Zn) skarns lie on a curvilinear trend immediately west of the Redstone Arch (Dick and Hodgson, 1982). Economically significant skarn deposits tend to form where intrusions cut limestone beds that are flat lying.

The skarns west of the Redstone Arch are fairly typical of W-Cu (Zn) metasomatic contact deposits worldwide, the characteristics of which have recently been summarized by Einaudi and Burt (1982). They are commonly in continental margin, syn- to late-orogenic tectonic settings and are associated with quartz diorite to quartz monzonite plutons and batholiths. Ore zones are devoid of cogenetic volcanic rocks. Endoskarn replacement of igneous rocks is local and limited to pyroxene and plagioclase, whereas exoskarn replacement of carbonates is extensive and typically comprises an early-formed mineral assemblage of ferrosalite-hedenbergite, grandite, idocrase and wollastonite; a late-formed assemblage of spessartine, almandine, grandite, biotite, hornblende and plagioclase; and an ore assemblage of scheelite, chalcopyrite, molybdenite and minor sphalerite, pyrrhotite, magnetite and pyrite.

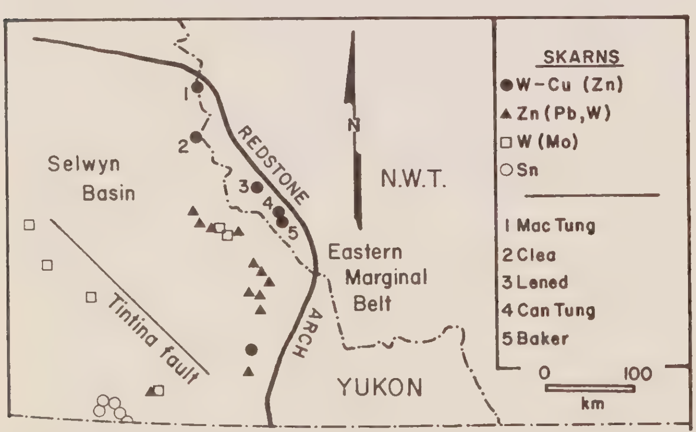


FIGURE 2-31: Tungsten skarns, eastern Selwyn Basin (from Dick and Hodgson, 1982)

Characteristics of the Cantung deposit that differ from the typical model described above include:

1) molybdenite is absent
2) pyrrhotite content is much greater than chalcopyrite or sphalerite content
3) pyrite is present only in late faults

(Pers. comm., B.F. Watson, Cantung geologist).

CANTUNG MINE

Canada Tungsten Mining Corp. Ltd.	Tungsten
P.O. Box 9	105 H/16
Tungsten, NWT	61°58'N,128°15'W

REFERENCES

Archibald and others (1978); Blusson (1968); Brown (1961); Cummings and Bruce (1977); Dawson and Dick (1978); Dick (1980); Dick and Hodgson (1982); Einaudi and Burt (1982); Gabrielse and others (1973); Gabrielse and Reesor (1974); Mathieson and Clark (1984); White (1963); Zaw (1976); Zaw and Clark (1978).

PROPERTY

Mining Leases 2449 and 3129 covering 2482 ha and comprising the following claims: AC 1-7; BC 1-8, 10-11; CED 1-49, 59-65, 67-73; EF 2, 5-8; RL 1, 3-5, 8-10, 19-20; WO 1-11.

Canada Tungsten also controls about 500 claims adjacent to or near the mining leases.

LOCATION

Cantung lies near the headwaters of the Flat River in the Selwyn Mountains, 644 km west of Yellowknife and less than 3 km east of the Yukon border. The town of Tungsten is serviced by a 306-km all-weather gravel road from Watson Lake, 209 km to the south in the Yukon Territory. A 1,219-m gravel airstrip at the minesite accommodates STOL aircraft.

HISTORY

A skarn in the floor of a mountain cirque at an elevation of 1,524 m was discovered and staked as a copper prospect for Northwestern Explorations Ltd in 1954. After exploration and drilling, the copper potential was deemed subeconomic and in 1958 the claims were allowed to lapse. Aware of scheelite in the deposit, the Mackenzie Syndicate immediately restaked the claims and Canada Tungsten Mining Corporation was formed to acquire and develop the

property. Drilling and tunnelling indicated about 1 Mt grading 2.47% WO_3 recoverable by open pit mining. Mining began in November of 1962 after completion of a gravel road to the property and installation of a 275 tpd concentrator. During the early years, operations were confined to the summer months. In 1970, exploratory drilling outlined a new ore zone (E-Zone) 550 m north of and 122 m below the open pit. By 1973, further drilling from an adit had established 3.63 Mt of ore in the E-Zone grading 1.6% WO_3 and 0.22% Cu. Open-pit mining was phased out in 1974, when year-round underground operations began. By 1978 the mill capacity had been increased to 450 tpd and underground development and diamond drilling had outlined additional ore to the west, upgrading reserves to 3.8 Mt grading 1.55% WO_3. Expansion of the mill was completed in 1979, doubling capacity from 450 tpd to 900 tpd and making Cantung the largest tungsten mine in the Western hemisphere.

DESCRIPTION

The main regional structure in the Cantung area is a northwest-trending syncline cored by Cambrian limestone, flanked by Cambrian or earlier phyllite and intruded by Cretaceous quartz monzonite stocks (Fig. 2-32). At Cantung, the 'Mine Stock' has altered some of the limestone to ore-bearing skarn.

The following description is mainly after Dick and Hodgson (1982). Ore-bearing skarns at Cantung are found in two distinct lithological units: the Ore limestone, which contains the bulk of the ore, and the Swiss Cheese limestone (Fig. 2-33). The Ore limestone is a relatively pure, 70-m-thick, coarsely crystalline, massive marble of Lower Cambrian age (Blusson, 1968). The underlying Swiss Cheese limestone is an equally thick unit comprising calcareous pods and thin, discontinuous beds of calcareous rock enclosed in a non-calcareous pelitic matrix. Only the calcareous component is significantly altered to skarn which, when mineralized, is termed 'chert ore' by Cantung geologists. The Ore and Swiss Cheese limestones are sandwiched between fine-grained, brown hornfels units known as the Upper and Lower argillite. This sequence has been deformed into a recumbent anticline and slightly displaced by high-angle faults.

There are two separate orebodies at Cantung; the open pit orebody and the E-Zone orebody. The open pit orebody, on the gently-dipping upper limb of the

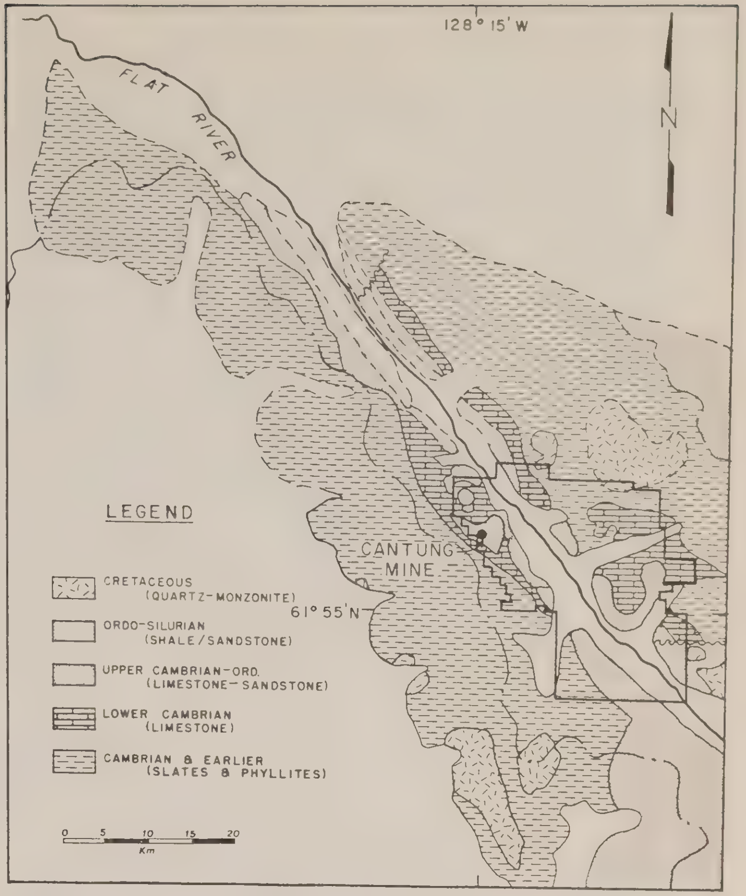


FIGURE 2-32: Regional geology, Cantung Mine area (from Gabrielse and others, 1973)

anticline, is in both the Swiss Cheese and Ore limestone. The E-Zone orebody, on the flat-lying lower limb of the anticline adjacent to the contact with the Mine Stock, is mainly in the Ore limestone (Fig. 2-33). The thickness and grade of ore of the E-Zone orebody diminishes rapidly as the dip of the beds steepen towards the hinge of the anticline.

The pit orebody is a shallowly southwest-dipping lens about 91 m wide and 20 m thick. The Ore limestone is cut by quartz-microcline-scheelite veins and is altered to a fine-grained clinopyroxene-garnet skarn containing pyrrhotite, scheelite, chalcopyrite and sphalerite. The Swiss Cheese limestone (chert ore) is lower grade and contains scheelite and pyrrhotite.

The E-Zone orebody is over 600 m long and typically 12 m thick by 60 m wide. Zaw (1976) showed that the E-Zone has an internal zoning broadly conformable to stratigraphy and comprising an upper zone of hedenbergite pyroxene and Fe-Mn-rich grossular, an intermediate amphibole-rich zone and a footwall biotite skarn. The E-Zone orebody contains scheelite, chalcopyrite, sphalerite, and non-magnetic pyrrhotite.

The Mine Stock is a quartz monzonite intrusion enveloped by an extensive thermal metamorphic aureole. It ranges from equigranular to porphyritic in texture and consists mainly of microcline, quartz, plagioclase and biotite. Quartz veinlets containing minor pyrite, arsenopyrite, scheelite and tourmaline are abundant in the stock near the skarn contacts.

Conversion of Ore limestone to skarn is considered to have taken place over a short period at a shallow depth (1000 bars) and at a temperature of 450^{0}C. The locus of skarnification and mineralization is thought to have migrated towards the roof of the Mine Stock as it cooled (Zaw and Clark, 1978).

CURRENT WORK AND RESULTS

Production and reserves at Cantung for 1976 to 1983 are listed in Table 2-24; mine development during 1982 and 1983 is summarized in Table 2-25.

1982

Cantung posted an operating loss because of weak demand and declining prices for tungsten. By year-end, the market price for tungsten was the lowest since underground mining began in 1974. (see Table 2-3).

Underground development included driving a raise to the open pit that will be used to provide underground fill. A hydraulic backfill plant was

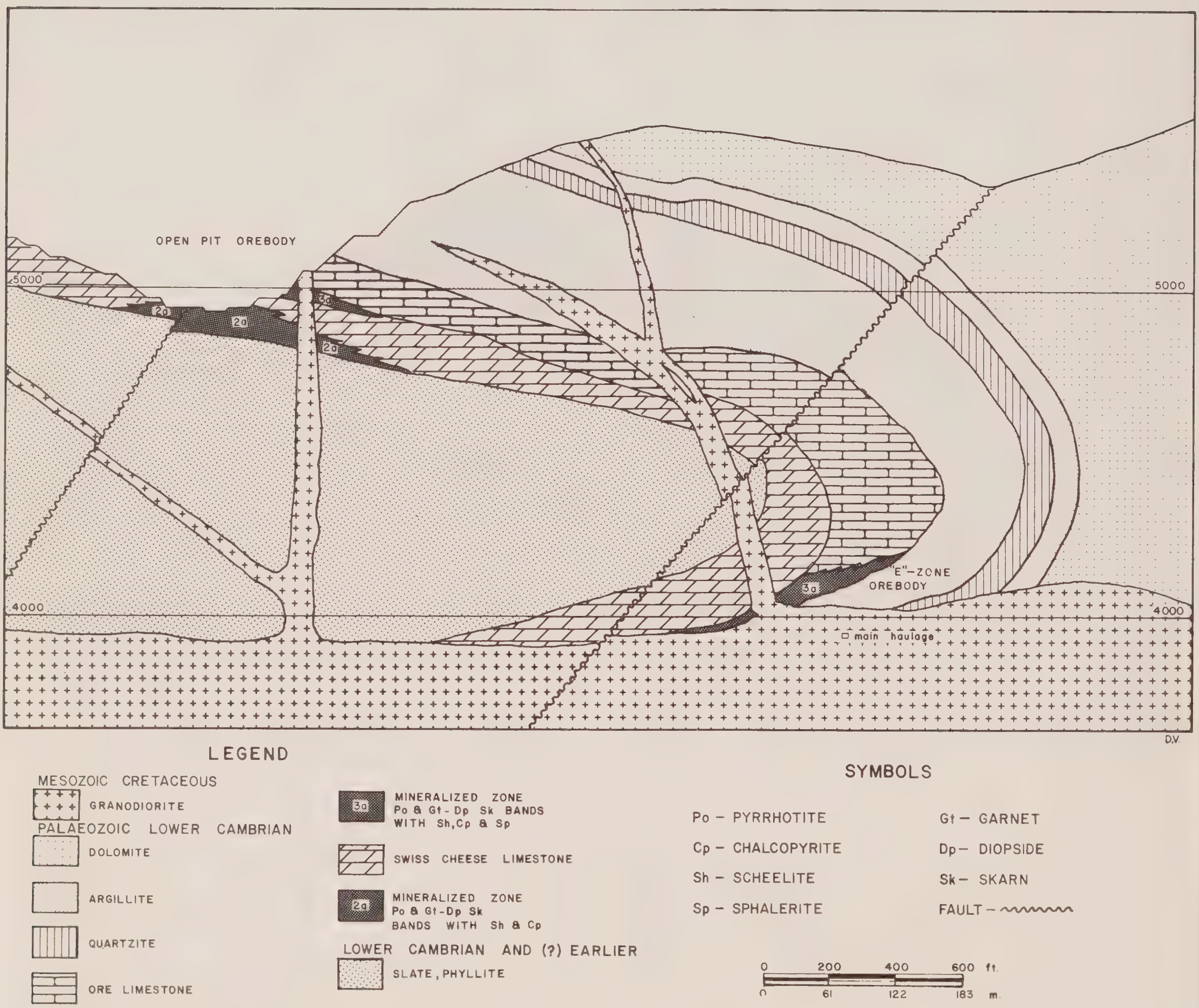


FIGURE 2-33: Typical geological cross section, Cantung Mine (after Cummings and Bruce, 1977)

constructed and placed in operation during the fourth quarter. Modifications that were made to the milling circuit reduced impurities, eliminated the use of cyanide as a reagent and increased recovery to 86.6% compared to 84.5% the previous year. No significant new results were obtained from underground exploration in 1982.

A re-evaluation of ore reserves was done during the year. Revised ore reserves (Table 2-24) reflect more definitive mining plans and increased allowance for dilution.

1983

Mining and milling operations were closed January 22 because of further declines in the price of tungsten. Customers were supplied from inventories during the shutdown, which lasted until December 1, when production resumed at a reduced rate. Underground development continued during the shutdown, mostly drilling to investigate the western end of the orebody.

TABLE 2-25: PRODUCTION AND RESERVES, CANTUNG, 1976-1983

	PRODUCTION		RESERVES	
	kt milled	kt WO_3	kt reserves	grade % W03
1976	170	2.2	3800	1.55
1977	165	2.3	3810	1.55
1978	175	2.9	3810	1.55
1979	245	3.3	3540	1.55
1980	317	4.0	3270	1.55
1981	215	2.5	3220	1.50
1982	328	3.6	2750	1.32
1983	36	0.35	2700	1.32

TABLE 2-26: MINE DEVELOPMENT, CANTUNG, 1982-1983

	lateral dev.	raising	surf. drill.	ug drill.
1982	1524 m	308 m	1437 m	12,699 m
1983	714 m	24 m	5221 m	5162 m

SOURCE: Mining inspection Service, Gov't NWT

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CHAPTER 3: NAHANNI DISTRICT

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INTRODUCTION

The Nahanni Region extends from Inuvik south to Fort Simpson and from the mountains just east of the Mackenzie River to the Yukon border. It comprises mainly the NWT part of the Cordilleran orogen.

There was little exploration in 1982 and 1983 (Fig. 3-1) as severe widespread recession affected markets for those mineral commodities (W, Pb, Zn, Cu) that are the main exploration targets in this part of the Cordillera. Canada Tungsten Corporation closed down their mining operation in January, 1983, but reopened by December.

G.S.C. Open File 868 was released in August, 1982, which resulted in a small staking rush in NTS 105 I. Canico, Amax and Aberford Resources acquired ground mainly on gold and tungsten anomalies.

The following description of properties are listed by metal commodity and geological environment as follows: 1) Stratiform shaled-hosted lead and zinc, 2) tungsten associated with skarns, and 3) gold and other minerals.

STRATIFORM, SHALE-HOSTED LEAD AND ZINC

SELWYN BASIN

Sediments of the Selwyn Basin or trough (Blusson, 1976) consist of carbonaceous calcarenite and shaly limestone of presumed deep-water origin. Minor components include argillaceous calcarenite, variegated shale and grey, green and black ribbon chert. The geology of the Howard's Pass area was mapped in 1977 by S.P. Gordey (1978).

Canex Placer's deposit at Howard's Pass is hosted in black shale-mudstone of the Road River Formation, about 60 meters above the contact with Cambro-Ordovician 'wavy-banded' limestone. The shale-mudstone occupies relatively shallow, spoon-shaped sub-basins developed on the platform-to-basin slope. A syngenetic to early diagenetic origin is postulated for these deposits.

The 'Black Clastic Unit' (Dawson, 1978) unconformably overlies the Road River Formation and consists of a lower slate unit containing minor coarse-clastic interbeds, and an upper unit consisting dominantly of coarse clastics.

The lower slate and shale units contain a barite bed which, in several areas, hosts stratiform lead-zinc deposits. Mineral occurrences have not been found in the upper coarse-clastic unit.

The barite bed in the lower unit is widespread, almost invariably at the same strati-graphic position. It ranges from thin lamellae intercalated within several metres of black shale, to massive, bedded deposits two to thirteen metres thick. Lead and zinc minerals are usually associated with the barite. Thickness and metal content probably reflect local structural, sedimentary and possibly volcanic controls.

The major deposits in the lower Black Clastic Unit, Tom and Jason, have similarities to the Devonian Meggen deposit in Germany. The Meggen model was used by companies exploring for similar deposits between MacMillan Pass and Tungsten.

FLAT LAKE PROPERTY

Placer Development Ltd.	Lead, Zinc
700-1030 West Georgia St.,	105 I/1
Vancouver, B.C.	$68^{0}7$'N,$128^{0}30$'W

REFERENCES

Gabrielse and others (1973); Morganti (1975). DIAND assessment report 081621.

PROPERTY

The Flat Lake property comprises 27 PAB, 66 HUG, 23 NIP, HUB 1, OOH 1 and BEE 1 claims.

LOCATION

The property surrounds the north end of Flat Lake which is 20 kilometres northwest of Tungsten, NWT.

HISTORY

Geochemical anomalies found by Placer Development Ltd. in 1966 were staked as the PAB group. In 1979, exploration consisted of geological mapping, geochemical prospecting and diamond drilling. Five hundred and ninety six metres of drilling in five holes did not intersect any significant base metal sulphides.

In 1973, the HUG claims were staked to cover geochemical anomalies found by a survey that year. Mapping and trenching were done in 1975 and in 1978 one bore hole intersected all stratigraphic units of

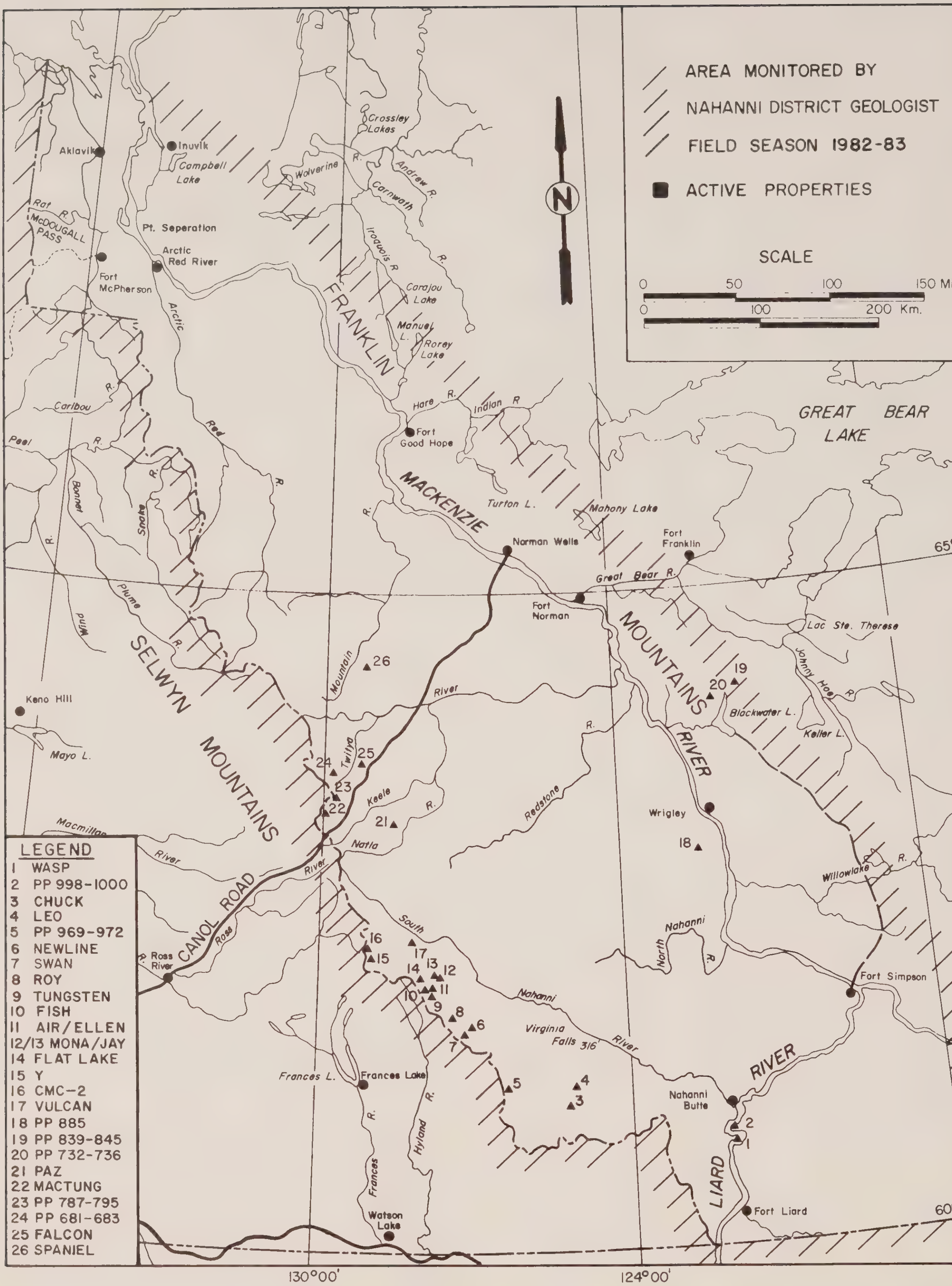


FIGURE 3-1: *Distribution of properties active in 1982-83*

the Howard's Pass Formation except the 'Active' member (Morganti, 1975). This member hosts the lead-zinc sulphides at Howard's Pass.

DESCRIPTION

The property is underlain by similar strata as that exposed at Howard's Pass. Structurally the strata have been folded into a synclinorium, the axis of which follows the Flat Lake valley in a northwestward direction. Pervasive regional cleavage strikes 140° and dips steeply to the southwest. Severe faulting has further complicated the geology of the area.

CURRENT WORK AND RESULTS

One hundred and fifty rock and thirty-five stream sediment samples were collected and analysed for barium, vanadium, lead and zinc. Mapping and paleontological studies were also done and in 1983 stratigraphic holes were drilled to try and intersect the 'Active' member of the Howard's Pass Formation.

Y CLAIMS

Placer Development Ltd. — Lead, Zinc, Silver
700-1030 West Georgia St. — 105 I/6
Vancouver, B.C. — $62^{\circ}28'$N,$129^{\circ}10'$W

REFERENCES

Gordey (1978); Green and others (1968); Morganti (1975).

DIAND assessment report 091189.

PROPERTY

Y 6-24, 27-30, 35-50, 60, 62-79, 88-113, 122-162.

LOCATION

The 125 claims straddle the NWT-Yukon border 80 km northwest of Tungsten. A 64 km winter road built in 1972-73 connecting Howard's Pass to the Tungsten Highway was replaced in 1977 by an all-weather road.

HISTORY

The Y claims were staked during the summer of 1972 to cover a large geochemical anomaly identified by Placer's regional exploration. In April, 1975, U.S. Steel began to contribute exploration funds with Placer continuing as manager.

DESCRIPTION

Howard's Pass lies within the Selwyn Mountains, which are carved from a sequence of northwesterly striking Proterozoic and Paleozoic sediments intruded by Cretaceous quartz monzonite and granitic stocks. The sediments have been folded on northwesterly trending thrust faults. The stratigraphy of the eastern Selwyn Basin is shown in Table 3-1.

	Green et al., 1967	Morganti 1975	Morganti, 1975
Pennsylvanian			Top of
		18b-3	Chert Pebble Conglomerate
Mississippian	T.O.S.	18b-2	Yara Reak Formation
		18b-1	Iron Creek Formation
Devonian		10b-3	Upper Chert Formation
Silurian	18b	10b-2	Flaggy Mudstone Formation
		10b-1	Howards Pass Formation
Ordovician		7b-4	Transition Formation
		7b-3	Wavy Banded Lst. Formation
		7b-2	Massive Limestone Formation
		7b-1	Lower Siltstone
Cambrian	7b		Grit Unit
Hadrynian	2 Grit Unit	2	

TABLE 3-1: STRATIGRAPHY OF EASTERN PART OF SELWYN BASIN

The main mineralized zone is on the southwest facing slope of a rounded, northwest-trending, overburden-covered ridge. Trenches bulldozed across the face of the ridge have exposed deeply weathered, black graptolitic shale. The trenches were not deep enough to penetrate the zone and thus were not reliable sources of structural information. As a result of the deep weathering, the mineralized areas are marked only by a faint gossan and locally by small amounts of secondary hydrozincite, smithsonite and cerussite.

The host rock, a black, graphitic, pyritic shale, is believed by company geologists to have been a mudstone. Lenses of black, coarsely-recrystallized limestone within the shale are about 1 m thick and probably less than 30 m long. The shale contains calcareous, pyritic nodules as large as golf balls. Thin wisps or layers of mudstone less than 5 cm thick impart a banded aspect to the limestone that underlies the ore zone. The mineralized zone lies within the Road River Formation shale which, together with the underlying banded limestone, form part of the southwest limb of a syncline. The host rocks strike northwesterly and were thought to dip steeply to the northeast, but detailed work indicates that the

structure is more complex.

CURRENT WORK AND RESULTS

Detailed mapping was done in select areas in 1982. No work was done in 1983.

CMC, Z CLAIMS

Cominco Ltd.	Lead, Zinc
200 Granville St.	105 I/6
Vancouver, B.C.	$62^{0}28'$N,$129^{0}05'$W

REFERENCES

Gordey (1978); Green and others (1968).

DIAND assessment report 080347.

PROPERTY

10 CMC claims; 36 Z claims.

LOCATION

The claims are 80 km northwest of Tungsten and adjoin Canex Placer's XY property in the Yukon Territory.

HISTORY

The CMC claims were staked in 1972, the Z claims in 1977. In 1973, the CMC group was mapped and a geochemical soil-sampling survey was completed. Anomalies were tested by 61.3 metres of trenching in 1975.

In 1979, a total of 15,100 metres of line was cut and pegged at 25-metre spacings. Crosslines were established along the baseline at 100-metre intervals. Five hundred and ninety soil samples were collected on the grid and an additional 52 samples were collected along two pace-and-compass reconnaissance lines. Samples were assayed for lead, zinc and silver. Several soil-geochemical anomalies were outlined.

DESCRIPTION

The Road River Formation, the underlying 'wavy-banded' limestone unit and the overlying 'Black Clastic' unit outcrop on the property. All units have been tightly folded into anticlines and synclines that plunge 15^{0} to the west. Faulting is common.

CURRENT WORK AND RESULTS

About 4,340 cubic metres of material were excavated from seven trenches. Six trenches were on the Z claims and one on the CMC claim.

No visible lead and zinc sulphides were found, although material from several trenches assayed greater than 1000 ppm Pb and 200 ppm Zn. The zinc is probably from hydrozincite coatings on the shale.

VULCAN, RX CLAIMS

Riocanex Exploration Ltd.	Lead, Zinc
520-800 W. Pender St.	105 I/8
Vancouver, B.C.	$62^{0}18'$N,$128^{0}10'$W

REFERENCES

Gabrielse (1973); Carne (1976) by A. Artmont (1979).

DIAND assessment report 081188.

PROPERTY

VULCAN 1-6 blocks (220 claims); RX 1-3 blocks (101 claims).

LOCATION

The claims are 50 km north of Tungsten.

HISTORY

Cyprus Anvil staked the BARBI claims in 1974 to cover lead-zinc-silver showings found on the northeast part of the present VULCAN claims. The BARBI claims lapsed after being mapped, trenched and sampled.

In 1978, Welcome North Mines Ltd. discovered a number of encouraging showings and staked 321 claims, the Vulcan property, which was optioned to Riocanex in 1979.

DESCRIPTION

The property lies on the west limit of the South Nahanni Anticline and covers strata ranging in age from Lake Proterozoic to Devono-Mississippian.

More than fifty galena, sphalerite, pyrite, fluorite and barite showings have been found within the stratigraphic interval from Late Cambrian to Middle Devonian. The significant showings occur at or near the contact between the Road River Formation and the underlying Sunblood Formation. Sphalerite and galena are found in chert breccias or interlaminated with chert and shales of the Road River Formation (Fig. 3-2).

Only the upper and middle members of the Sunblood Formation are present on the property. These form a stratigraphic succession 600 to 800 metres thick.

The middle member, a fine-grained, light grey to mottled dolostone with interbedded limestone, contains several volcanic flows near the top. The flows comprise dark green to rusty brown weathering, highly pyritic (up to 20%) amygdaloidal andesite and tuff that have been altered to fine-grained, chlorite-quartz-sericite schist.

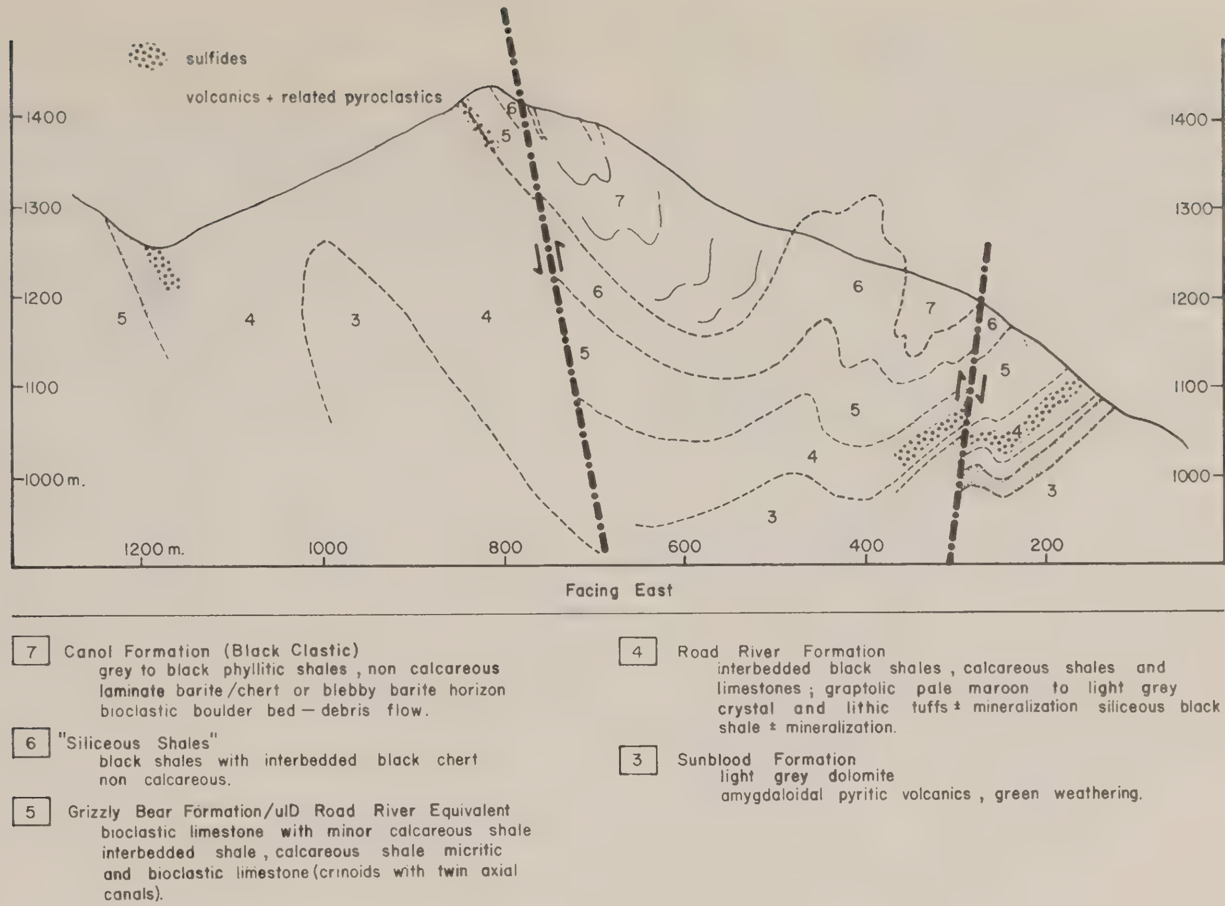


FIGURE 3-2: Cross section of the Vulcan Property

The upper member comprises well-bedded to platy, dark grey to black argillaceous limestone and laminated, pink to grey limestone with minor dolostone, shale and siltstone interbeds.

The Road River Formation unconformably overlies the Sunblood Formation and comprises interbedded calcareous and non-calcareous, fine-grained black clastics with minor carbonates. The Road River Formation is divisible into lower, middle and upper members. The lower member consists of dark grey to black argillaceous limestone, shale and chert; the middle member of buff to orange to silvery-weathering siltstone, chert and limestone; and the upper member of fissile, black, sooty shale, limestone and calcareous tuff.

Significant deposits are hosted by siliceous black shale and tuffaceous sediments within the upper member of the Road River Formation.

The main showing found on VULCAN claims has a distinct transition along strike from massive sulphides to shale hosted sulphides to barite-fluorite-galena.

The massive sulphides are composed of fine grained pyrite (80%) with interstitial galena, sphalerite and quartz (20%).

The shale-hosted sulphides have been divided by Artmont (1979) on the basis of texture into three classes: laminated, pseudolaminated and breccia-matrix sulphides. The laminated sulphides are usually fine grained pyrite. The laminae vary in thickness from 0.1 cm to 2 cm and conform to bedding. Galena and sphalerite are found with the pyrite where the shale becomes more siliceous and less calcareous. The pseudo-laminated sulphides; pyrite, sphalerite and galena; are less conformable to bedding and in some instances cross-cut the shales. These cross-cutting veinlets appear to be controlled by the foliation.

The breccia-matrix sulphides consist of angular clasts of siliceous shale and laminated pyrite in a quartz-pyrite-sphalerite-galena-muscovite matrix. This sulphide breccia has been likened to similar ones at the Tom deposit at MacMillan Pass. Carne (1976) suggests that the breccia represents the venting area for hydrothermal fluids. In this

process, the early fluids migrated through the sea floor sediments, silicified the shale and produced a self-sealing cap. Steam-blast eruptions then brecciated the sediments and allowed mineralizing fluids to discharge on the sea floor and infill the breccia.

The massive barite-fluorite-galena assemblage, at its best exposure, is 18 m thick and is composed of clear to white, coarsely crystalline barite with interstitial and vein fluorite. Galena is irregularly distributed as coarse-grained 'galena balls' up to 50 cm across. Accessory minerals are calcite, quartz and pyrobitumen.

G. Artmont of Riocanex proposes the model shown in Figure 3-3 to explain the sulphide formation and distribution.

He favours a syngenetic origin, with sulphides accumulating on an unstable shelf margin in a semi-restricted sub-basin. Epigenetic fluorite-galena veins would be formed at a later stage by structural and metamorphic processes.

CURRENT WORK AND RESULTS

Detailed mapping in selected areas of the property and relogging of some of the core was done to unravel some of the structural and stratigraphic complexities. No work was done in 1983.

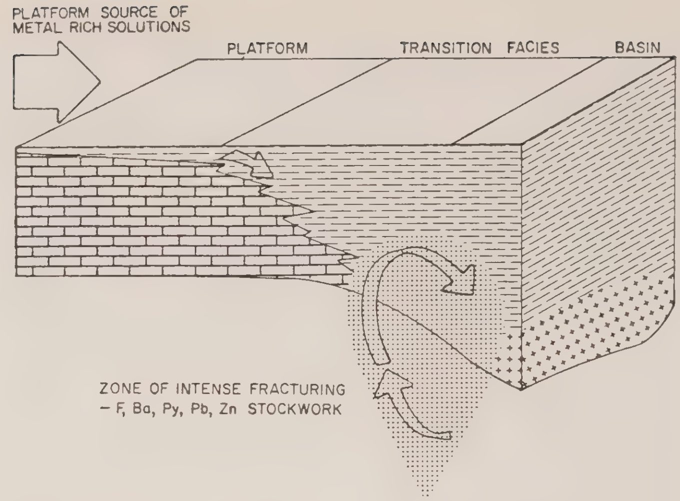


FIGURE 3-3: Model of sulfide formation and distribution, Vulcan property (from assessment report by G. Artmont)

PROSPECTING PERMITS 681-683

Canadian Nickel Company Ltd.	Lead, Zinc
Copper Cliff, Ontario	105 O/16
	63°55'N,129°45'W

REFERENCES

Blusson (1974); Cecile (1978); Goodfellow and others (1980).

DIAND assessment report 081638.

PROPERTY

Prospecting Permits 681-683.

LOCATION

The permits are 225 kilometres north-northwest of Ross River, Y.T.

HISTORY

Permits 681 to 683 were acquired in 1980.

DESCRIPTION

The permits cover part of the Selwyn Basin known as the Misty Creek Embayment (Cecile, 1978). The embayment is a 100 km x 150 km rectangular northwest-trending depression bounded on three sides by platformal carbonates and separated from the Selwyn Basin by a paleo-submarine ridge.

Sedimentation, which took place from the Cambrian to the end of the Silurian, deposited up to 3,000 metres of fine-grained clastics. This compares to the 600 metres of carbonates deposited on the Mackenzie Platfrom during the same time.

North of Permit 681 a volcanic centre spewed out lapilli and fine-grained tuffs, breccia and amygdaloidal flows in Ordovician times.

The Misty Creek Embayment sequence of strata have been folded into tight anticlines and synclines trending northwest.

Normal and thrust faults that parallel the general strike direction of the embayment repeat the formations, particularly those in the Lower Paleozoic carbonates. This repetition is more recognizable in the carbonates than in the monotonous sequence of fine clastics of the Besa River Formation and Imperial Formation where overturning and dislocation of strata are difficult to document.

Goodfellow and others (1980) have stated that the shales of the embayment are enriched in Zn, Ag, Mo, Sb, Cd, Ba, V, Ce and Sr, in particular the Hess River Formation and Duo Lakes Formation.

Barite, as massive beds and spots, was found in the upper part of the Besa River Formation and the Hess River and Duo Lakes Formations contained pyritic nodules and interbeds.

CURRENT WORK AND RESULTS

Detailed rock sampling and prospecting traverses were done over areas of the Besa River Formation

anomalous in lead and zinc.

This work, however, did not reproduce the anomalous results found by previous surveys, nor find any other anomalies. No further work was proposed for 1983.

PAZ CLAIMS

Canadian Nickel Company Ltd. — Lead, Zinc
Coppercliff, Ontario — 105 P/8
$63^{o}17'N, 128^{o}26'W$

REFERENCES

Blusson (1971).

DIAND assessment report 081477.

PROPERTY

PAZ 1, 2 and 3.

LOCATION

The three claims are 83 km east of MacMillan Pass, NWT.

HISTORY

In 1974, Bethlehem Copper Corporation found several low-grade carbonate-hosted lead-zinc deposits. One of these is in the northeast part of PAZ 2.

In 1979, Welcome North Mines Ltd. found high grade lead-zinc samples in unit 10b of G.S.C. Map 133A (Fig. 3-4). This area was staked as the MAJESTY claims, and optioned to Rio Canex. The PAZ claims were staked in 1980 to cover map unit 10b, north of the MAJESTY claims.

DESCRIPTION

PAZ 1-3 are underlain by Blusson's map units 10b, 11, 12 and 14 (Fig. 3-4).

The sequence has been folded into an eastward-dipping homocline which has been cut by a north-trending steeply westward-dipping normal fault.

CURRENT WORK AND RESULTS

The claims were prospected and mapped at a scale of 1:2500. Unit 10b the host rock on the MAJESTYclaims is poorly exposed on the PAZ claims and no stratigraphic top or bottom was observed, making any correlation with the Majesty deposit impossible.

Seventeen rock samples were collected, and analysed for their lead, zinc and silver content. VLF and Max Min III EM surveys did not indicate any sulphide concentrations, neither did prospecting find any lead or zinc minerals; no further work was done in 1983.

PROSPECTING PERMITS 787-795

Kelvin Energy Ltd. — Lead, Zinc
706 - 7th Ave., S.W., — 105 P/16
Calgary, Alta., T2P 0Z1 — $63^{o}30'N, 129^{o}15'W$

REFERENCES

Blusson (1971); Abbott (1982); Cecile (1978).

DIAND assessment report 081570.

PROPERTY

Prospecting Permits 787-795.

LOCATION

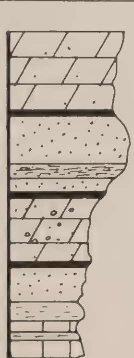
The permits are 65 kilometres northeast of MacMillan Pass (Fig. 3-5).

HISTORY

The permits were acquired in January, 1981, by Kelvin Energy Ltd. and optioned to Pan Ocean Oil Ltd., now Aberford Resources Ltd., in the fall of 1981. Regional mapping, prospecting and geochemical surveys were done that year.

DESCRIPTION

The permits cover the transition between platform carbonates and the fine grained black clastics of the Selwyn Basin (Table 3-2).



Age	Formation	Map Unit	
Cambrian	Sekwi Fm.	14	Orange weathering dolostone and siltstone. Locally has tribolites and brachiopods.
	Backbone Ranges Fm.	12	Light grey, white & pink coarse grained orthoquartzite; minor siltstone & silty shale, ± 900 m thick.
Cambrian Hadrynian			
	Sheepbed Fm.	11	Buff weathering, thick bedded dolomite. in part oolitic & sandy, +150 m thick.
		10b	Dark grey, brown, green, laminated to thin bedded sst. & silty shale, minor limestone. Black dolomitic limestone near base, + 1000 m thick

FIGURE 3-4: Stratigraphy exposed on the PAZ Claims

Quaternary		Glacial Deposits
Carboniferous to Mississippian		Calcarenite Calcarenite, black calcareous shales White to brown weathering blocky quartzite
		unconformity
Middle to Upper Devonian		
Upper Earn Group	CP_{SH1}	Black calcareous shale, limestone
	DM_{SH} (DM)	Brown-rusty weathering, black sility shales that contain nodular pyrite.
	DMU	Brown-grey weathering sandstone, siltstone, conglomerate, shale
		unconformity
Middle Devonian		
Lower Earn Group	D_3	Silver weathering, siliceous, blue-black shale, regional barite horizon, sandstone
	D_2	Brown weathering, siliceous black shale, sandstone, minor conglomerate
		unconformity
Lower to Middle Devonian		
Natla-Grizzly Bear	D_{LS}	Fossiliferous limestone
		unconformity
Lower Ordovivian to Lower Silurian Road River Group Duo Formation (Transitional Facies)	OSD	Light grey, calcareous shales and siltstones (+/- volcanics)
		unconformity
Upper Cambrian to Lower Ordovician Road River Group	uCOr	
Rabbitkelle Formation		Yellow weathering linestones with pyrite nodules, and interstratified grey-black calcareous shale
Middle Cambrian Road River Group Hess River Formation		Black, pyritic, unfossiliferous shale interstratified with black, calcareous shale and rusty black shale
		unconformity
Lower Cambrian Sekwi Formation	$H_L C_S$	Dolomite, orange to grey weathering limestone, silty limestone, limestone slope breccia, quartzite
		unconformity
Lower Cambrian Backbone Ranges Formation	$H_L C_S$	Reddish-brown quartzite and sandstone

TABLE 3-2: STRATIGRAPHIC SECTION OF PROSPECTING PERMITS 787-795

The rocks have been folded along northwest-trending axes into tight synclines and anticlines. Faults are common.

CURRENT WORK AND RESULTS

A stream sediment sampling survey was successful in detecting four mineral showings. Two were nodular barite horizons, the other two zinc in the form of sphalerite and hydrozincite infilling fractures in carbonates and as coatings on shale outcrops. No further work was recommended for 1983.

TUNGSTEN ASSOCIATED WITH SKARN

Tungsten-bearing skarns are associated with a belt of small Cretaceous quartz monzonite and granodiorite intrusions along the hinge between late Proterozoic to Paleozoic, predominantly fine-clastic rocks of the Selwyn Basin and equivalent-aged carbonates of the Mackenzie Platform (Fig. 3-5). This transition zone is also the locus for important base metal deposits, i.e., Howard's Pass, Tom and Jason.

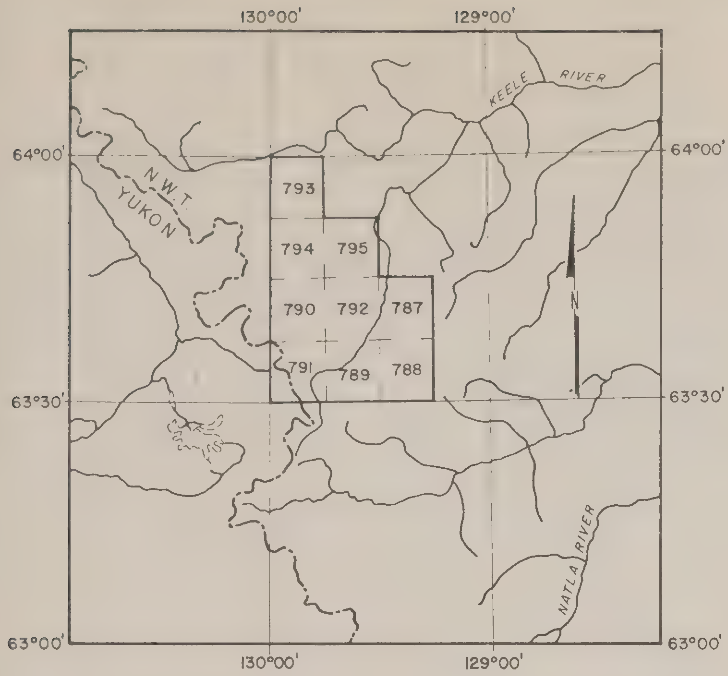


FIGURE 3-5: Location sketch of Prospecting Permits 787-795

The Tungsten, Mactung and Lened deposits account for most of the free world's production and reserves of tungsten, making this region economically and strategically important. The severe climate, remoteness, lack of infrastructure and consequent high operating costs are obstacles that must be overcome to bring some of these deposits into production.

Intrusions, predominantly quartz monzonite plutons, were emplaced into relatively unmetamorphosed rocks and formed extensive contact metamorphic aureoles (Dick and Hodgson, 1978).

Tungsten-bearing skarns formed in calcareous rocks adjacent to the plutonic contact. The more significant deposits formed where the pluton intersected calcareous strata at a shallow angle. Usually the skarns are dark green in colour and comprise calcium, magnesium and iron-bearing silicates such as pyroxene, garnet, actinolite and biotite.

Scheelite is the principle tungsten-bearing mineral, although ferberite, a mineral of the wolframite series, has been identified at Mactung.

Chalcopyrite, pyrite and pyrrhotite are associated with the skarns but their abundance is unrelated to the amount of scheelite present.

SWAN CLAIM

Memo Resources Ltd.	Tungsten
2855 King Edward Ave.	95 E/11
Vancouver, B.C., V6L 1V1	61°33'N,127°27'W

REFERENCES

Blusson (1968); Gabrielse and others (1973).
DIAND assessment report 081661.

PROPERTY

SWAN 1.

LOCATION

The claim is 75 kilometres southeast of Tungsten, NWT.

HISTORY

The claims was staked in 1981, although the area had been prospected in 1959 by the Mackenzie Syndicate.

DESCRIPTION

Most of the claim is underlain by a granodiorite pluton. At the northwest corner of the claim the pluton is in contact with cherty calc-silicate rocks of the Sekwi Formation. The Rabbitkettle Formation overlies these skarnified carbonates.

CURRENT WORK AND RESULTS

Airborne magnetometer and VLF-EM surveys were done over the claim.

FISH CLAIMS

Canada Tungsten Mining Corp.	Tungsten
1600, 1066 W Hastings Street,	105 H/16
Vancouver, B.C. V6E 3X1	61°50'N,128°18'W

REFERENCES

Blusson, S.L. (1967).
DIAND assessment report 081554.

PROPERTY

FISH 1 to 23, FISH B.

LOCATION

The claims are 7 kilometres northwest of Tungsten, NWT.

HISTORY

FISH claims 1-23 were staked in 1975 and FISH B in 1977.

DESCRIPTION

The claims cover the northeasterly dipping limb of an overturned syncline whose stratigraphy is similar to that found at the Tungsten mine (Fig. 3-6).

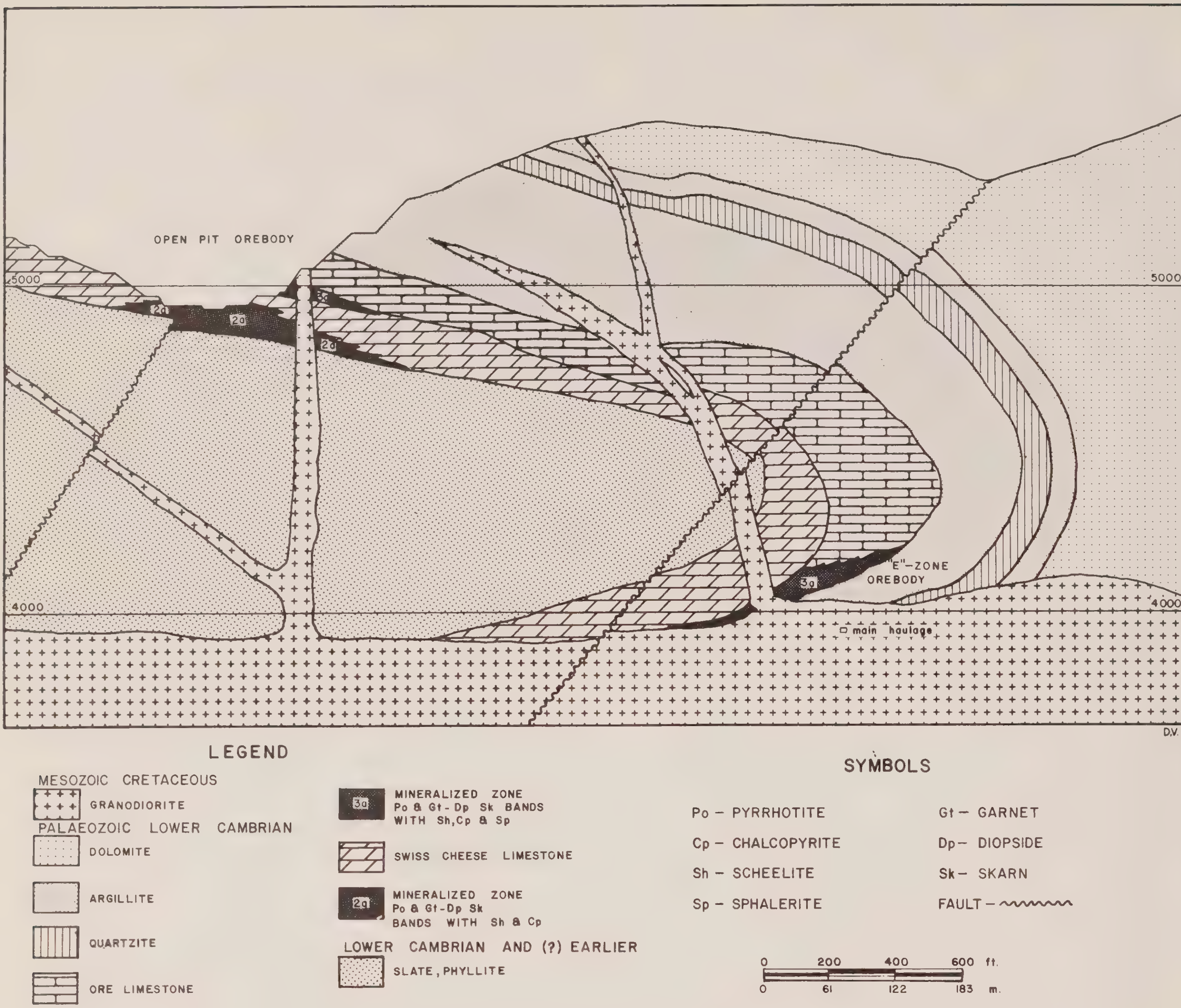


FIGURE 3-6: Cross-section of Cantung Mine

Two granite stocks, the 'Circular' and 'Mine', intrude the sequence.

Exploration targets were tungsten skarns possibly developed in the Swiss Cheese and Ore limestones (Fig. 3-6).

The Swiss Cheese limestone has an outcrop width of up to 100 metres and has been altered to a garnet-bearing pale-green siliceous skarn at its upper contact with the Ore limestone.

Overlying the Swiss Cheese limestone, the Ore limestone comprises grey-weathering, banded, coarse grained, crystalline limestone with minor calcsilicate alteration on the upper and lower contacts. The outcrop varies in width from less than 10 metres northwest of the open pit to over 65 metres in the northwest of the claim block.

The Rabbitkettle Formation overlies the Mine sequence and several small siliceous garnet skarns with minor pyrrhotite, scheelite, chalcopyrite and molybdenite formed at the contact with the Circular stock.

CURRENT WORK AND RESULTS

The claims were prospected and mapped at a scale of 1:4800. A bore hole drilled in 1983 for 786 metres, tested the contact between the Ore limestone and Circular stock.

AIR, ELLEN CLAIMS

Canada Tungsten Mining Corp. Ltd.	Tungsten
303 - 535 Thurlow St.,	105 H/16
Vancouver, B.C.	62°00'N,128°03'W

REFERENCES

Blusson (1968).

DIAND assessment report 081545.

PROPERTY

AIR 32-37, 53-65, 69, 81, 85-96, ELLEN 1.

LOCATION

The AIR Claims at Tungsten adjoin the southern boundary of Cantung's mine leases.

HISTORY

The claims were staked in 1975 and geochemically surveyed in 1977 and again in 1980.

DESCRIPTION

The Swiss Cheese limestone (Fig. 3-6), a carbonate member of the Sekwi Formation, outcrops on the claims. This is overlain by argillites, siltstones and dolostones of the Upper Sekwi Formation. The Rabbitkettle Formation unconformably overlies the Sekwi Formation.

CURRENT WORK AND RESULTS

One diamond drill hole totalling 763.42 metres intersected the Swiss Cheese limestone-quartz monzonite pluton contact.

MACTUNG DEPOSIT

Amax Northwest Mining Co. Ltd.	Tungsten
601 - 535 Thurlow St.	105 0/8
Vancouver, B.C.	63°17'N,130°07'W

REFERENCES

Blusson (1971); Harris (1977).

DIAND assessment report

PROPERTY

BORDER 11; GUM 1-8; GUT 1-24; PIX 1-30; PUP 1-14; EAGLE 1; CANOL 1; POND 1; GRAYLING 1.

LOCATION

This property straddles the Yukon-NWT border 11 km north of the Canol road at MacMillan Pass. Access to the claims is by road from Ross River, 208 km to the southwest, or from an airstrip at MacMillan Pass.

HISTORY

Scheelite showings discovered in 1963 by J.F. Allan were staked by Southwest Potash Corporation, a subsidiary of American Metal Climax Incorporated. The claims were transferred to Amax Exploration Inc. in March of 1967. Amax Exploration changed its name to Amax Potash in 1971, and in 1972 transferred its ownership to Amax Northwest. Mining lease 2605, Lot 166, covers 572 hectares of the property.

Surface sampling and mapping in 1963-64 was followed by almost 10,600 metres of diamond drilling in 1968 and 1971-73. In 1973, 735 metres of underground workings were driven and 272 tonnes were mined for mill tests. At the end of 1973, Amax announced ore reserves of 27 million tonnes grading 0.90% WO_3. In 1982, these reserves were updated to 60 million tonnes of 0.90% WO_3.

DESCRIPTION

A Cretaceous quartz monzonite stock intrudes Late Proterozoic to Paleozoic miogeosynclinal strata. The Paleozoic rocks are mixed shale and carbonate representing the facies boundary between the Selwyn Basin clastics and the Mackenzie Platform carbonates.

The carbonates have been altered to skarn and contain an Upper Ore Zone comprising three tungsten-bearing lenses and a Lower Ore Zone consisting of a single tungsten-bearing horizon (Fig. 3-7).

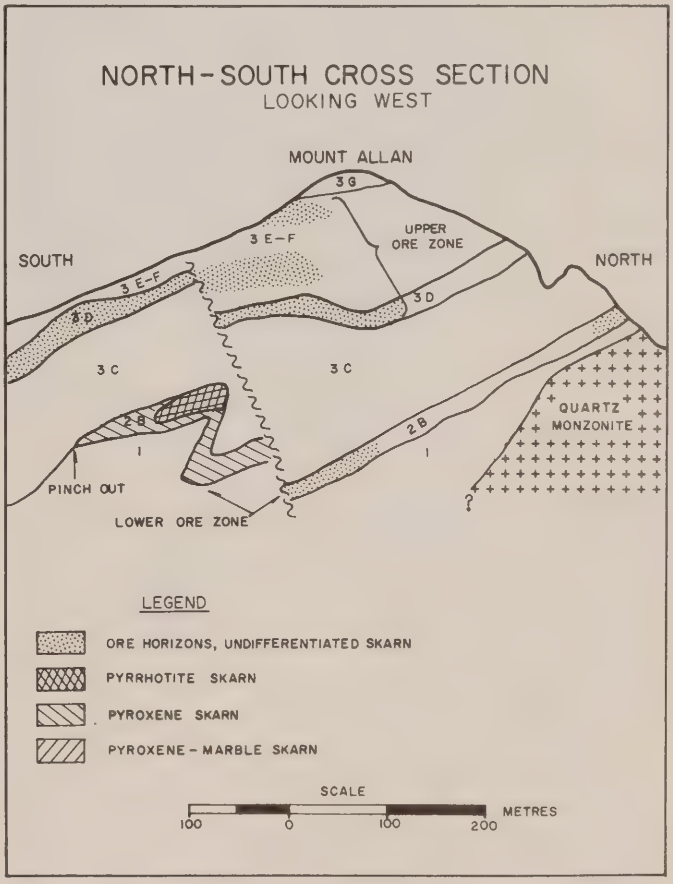


FIGURE 3-7: Cross-section of Mactung

The bottom and top of the Lower Ore Zone coincide with the contacts of a brecciated limestone unit. Pyroxene-marble, pyroxene and pyrrhotite skarn can be recognized, as well as minor cherty and chloritic skarn. Although the pyroxene skarn is the predominant type, the pyrrhotite skarn forms the high-grade core.

The Upper Ore Zone is separated from the Lower Ore Zone by 78 m of barren hornfels. The three tungsten-bearing units of the Upper Ore Zone are separated from one another by 18 m of barren argillite and hornfels. The top two units consist of layers of scheelite-bearing pyroxene skarn up to 25 cm thick with intervening barren hornfels or low-grade cherty skarn. The bottom layer contains disseminated scheelite in limestone breccia beds up to 1 m thick and in skarn beds up to 25 cm thick.

CURRENT WORK AND RESULTS

Surveys for mine and mill were done in preparation for development in the mid 1980's and regional mapping was done to the south around the Canol Road.

GOLD AND OTHER MINERALS

Exploration for placer gold was mainly by Hudson Bay Exploration and Development on the Liard River whilst vein-type gold was sought after by independent prospectors around the Cretaceous intrusives near Tungsten. Other exploration companies had regional programs looking for perhaps a Carlin type deposit around the Skinboat Lakes - Caribou River area of the South Nahanni.

Included in this section are reports on diamond, barite and multi-metal vein type exploration.

PROSPECTING PERMITS 998-1000

Hudson Bay Exploration	Gold
and Development Co. Ltd.	95 B/14
Toronto-Dominion Centre	$60^{o}45'N, 123^{o}30'W$
Toronto, Ontario M5K 1B8	

REFERENCES

Lord (1982).

DIAND assessment report 081744.

PROPERTY

Permits 998-1000.

LOCATION

The permits cover part of the Liard River near Flett rapids, approximately 80 kilometres south of Nahanni Butte.

HISTORY

Gold has apparently been periodically mined from gravel bars along the Liard River since the early thirties (Lord, 1982). The permits were acquired in 1983.

DESCRIPTION

The permits are underlain predominantly by glacial fill with some lacustrine clays exposed on permit 998. The river banks consist of well-sorted gravels overlain by different thicknesses of silt. The river has many mid-channel and point bars presently developing.

CURRENT WORK AND RESULTS

The banks of the Liard River were sampled between Flett Rapids and Nahanni Butte at 1 km intervals on both sides of the river.

One hundred and sixty-nine sites were sampled and an average of 3.73 samples of .01 cubic meters of material were taken at each site. All samples were panned and the number of gold particles recorded.

Gold was found to be concentrated in the youngest point bars at the gravel silt interface. The gold is fine and flaky with an estimate of between 30,000 to 150,000 colours equal to 1 g of gold.

WASP CLAIMS

D. Turner	Gold
G.P.O.	95 B
Fort Simpson, NWT	$60^{o}50'W, 123^{o}00'N$

REFERENCES

Lord (1982).

DIAND assessment report 081639.

PROPERTY

WASP 1 and 2.

LOCATION

The WASP claims cover gravel bars on the Liard River.

HISTORY

The claims were staked in 1980.

DESCRIPTION

The gravel bars covered by WASP 1 and 2 are sorted gravels of varying sizes. They have accumulated in a typical point bar situation. Fine gold accumulates in higher concentrations on the leading edge of these bars.

FIGURE 3-8: Vegetated abandoned point bars of the Liard River near Flett Rapids

CURRENT WORK AND RESULTS

One hundred and ninety-five cubic meters of gravel moved by two dredges and 194 cubic meters of gravel from two trenches were put through a sluice box.

Assays of the concentrate contained up to 10.423 g/ton Au and 3.291 g/t Ag.

CHUCK CLAIMS

Severn Ltd.	Gold,Copper
Vancouver, B.C.	95 D/15
	$60^{0}57'$N,$126^{0}36'$W

REFERENCES

Gabrielse and others (1973).

DIAND assessment report 081665.

PROPERTY

CHUCK 1 and 2.

LOCATION

The claims are 143 kilometres southeast of Tungsten, NWT, on a west-flowing tributary of the Caribou River.

HISTORY

The claims were staked in 1981 when Severn did detailed silt sampling, prospecting and geological mapping.

DESCRIPTION

The rocks on the property have been folded into a south plunging, open anticline (Fig. 3-9). The Lower Cambrian Sekwi Formation, which is exposed in the core of the anticline, consists of a sequence of dark green vesicular andesite and basalts interbedded with grey limestones and tuffs.

Chlorite-epidote alteration is common in the andesites, which in some areas are intensely silicified and sericitised. Limonite, jarosite and hematite are found in these silicified areas.

A sandy dolostone marks the top of the Sekwi Formation, which is overlain by the carbonates of the Rabbitkettle Formation.

To the north of the property the South Skinboat Pluton intrudes these sediments and volcanics.

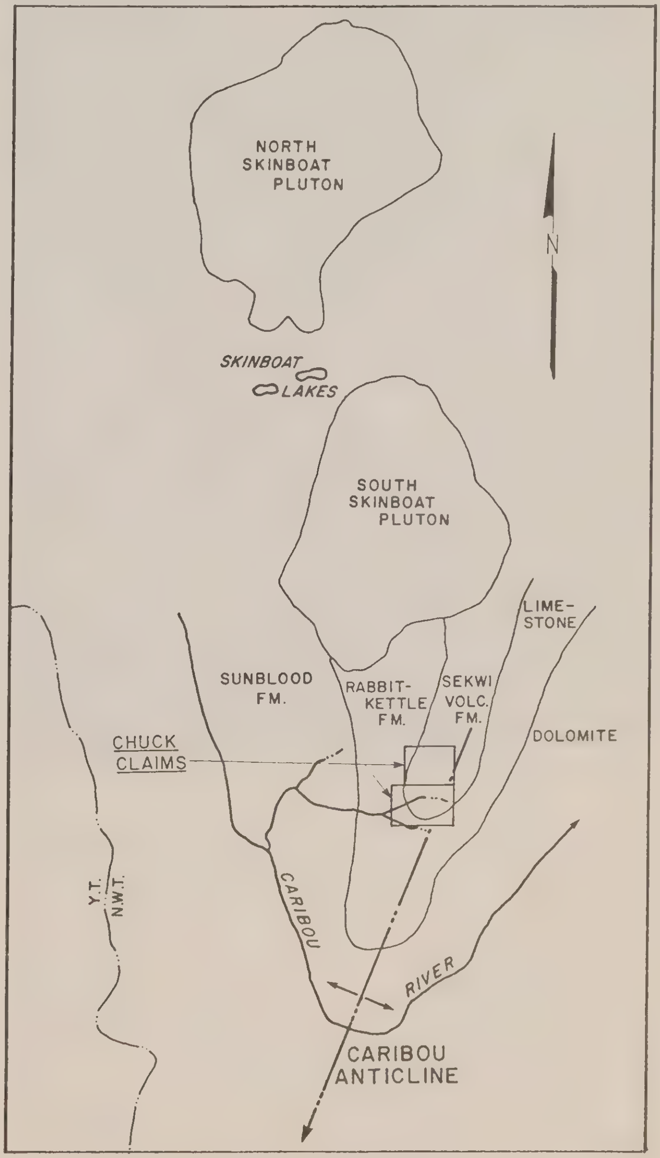


FIGURE 3-9: Geological sketch map of the area surrounding the Chuck claims

CURRENT WORK AND RESULTS

The claims were prospected and detailed geochemical surveys were done over gold anomalies found by previous regional surveys.

Pyrite, pyrrhotite, malachite, chalcopyrite and magnetite were found as disseminations and fracture and amygdule fillings in the volcanics of the Sekwi Formation.

Visible fine gold was panned from silt in a creek on CHUCK 1, and although gold was found by analysing some of the silicified and sericitised volcanics no visible gold was found in hand specimen.

The highest gold content found from 25 rock samples was 0.62 ppm Au.

PROSPECTING PERMITS 969-972

Esso Resources Canada Ltd.	Gold, Lead, Zinc
237 - 4th Ave. S.W.,	95 E/2
Calgary, Alta.	$61^{\circ}00'$N,$127^{\circ}00'$W

REFERENCES

Gabrielse and others (1973).

DIAND assessment report 081741.

PROPERTY

Prospecting permits 969-972.

LOCATION

The permits are centred around Skinboat Lakes, which is 92 kilometres southwest of Tungsten, NWT.

HISTORY

The permits were acquired in 1983.

DESCRIPTION

The permits cover that part of the Selwyn Basin between the Caribou and Flat River areas of the Mackenzie Mountains.

The recessive clastics of the Road River Formation (Fig. 3-10) are overlain by a thick carbonate sequence of the Rabbitkettle and Sunblood Formations. The whole sequence has been intruded by a large Cretaceous pluton centred around the Borden and Canyon Creek areas.

The outcrop is usually restricted to high ridges, knolls and plateaux. The major valleys have been glaciated and filled with up to 30 m of stratified glacial fill, including kames and eskers.

CURRENT WORK AND RESULTS

Thirty-six rock-chip samples collected from numerous traverses were analysed for Au, Ag, Pb, Zn and W from the coarse, heavy-minerals separates and for Au, Ag, As, Pb, Zn, Cu and Mo from the silt fraction. This geochemical program detected three areas anomalous in gold, zinc and tungsten. The gold around the mouth of Gold Creek was attributed to reworking of placer concentrations from the glacial till.

The zinc around Gold Creek and along the Caribou River came from smithsonite coatings on the fine grained clastics of the Road River Formation. 'Spot highs' for tungsten probably indicate skarn-type deposits in the carbonates close to the pluton. No further work was recommended for 1984.

FIGURE 3-10: Road River Formation exposed by the Caribou River

LEO CLAIMS

L. Schimanek	Gold
c/o G.P.O.	95 E/8
Fort Simpson, NWT	$61^{\circ}15'$N,$126^{\circ}15'$W

REFERENCES

Gabrielse and others (1973).

DIAND assessment report

PROPERTY

LEO 1 and 2.

LOCATION

The claims border the north and west shores of Clarke Lake (Fig. 3-11), which is 280 km west of Fort Simpson, NWT.

FIGURE 3-11: Clarke Lake; recessive shales in the foreground, granitic intrusions in the background

FIGURE 3-12: Immature gravels exposed on Moose Creek

HISTORY

The claims were staked in 1981.

DESCRIPTION

These placer claims cover several small misfit streams which drain eastwards from a large quartz monzonite intrusion 8 km to the west. The gravel is typically poorly sorted and has a high sand content (Figs. 3-12 and 3-13).

CURRENT WORK AND RESULTS

Three creeks crossing the claims were panned for gold. An occasional flake of fine gold was found.

FIGURE 3-13: Gravelly sand exposed on Grizzly Creek

MONA CLAIM

Alex Black	Gold, Silver, Lead
Box 634	105 I/1
Watson Lake, YT YOA 1CO	62°06'N,128°7'W

REFERENCES

Gabrielse and others (1973).

DIAND assessment report

PROPERTY

Mona 1.

LOCATION

The claim is 20 kilometres north of Tungsten, NWT.

HISTORY

The claim was staked by A. Black in 1981 and transferred to Goldex Resources the same year.

DESCRIPTION

The claim is underlain by greenish-black shales and quartzites intruded by a quartz monzonite stock in the northeast corner of the claim.

CURRENT WORK AND RESULTS

A trench was dug in the shales and several arsenopyrite veins were uncovered. Samples of these veins contained up to 8.5 ppm Au and 88.9 ppm Ag.

JAY CLAIMS

Alex Black	Lead, Zinc, Gold,
c/o Watson Lake, YT	Silver
	105 I/1
	$62^{o}05$'N,$128^{o}12$'W

REFERENCES

Gabrielse (1973).

LOCATION

The claims are 24 km northwesterly from Tungsten.

HISTORY

JAY 5, 6, 11 and 12 were staked in 1973.

DESCRIPTION

The claims are underlain by greenish black and gray fissile shales and quartzites intruded by a quartz monzonite stock.

Numerous small (1 cm - 15 cm) minor veinlets composed of quartz with zinc, lead and silver cross cut the local foliation in these shales.

Gold is associated with some of the veins.

CURRENT WORK AND RESULTS

Three small trenches were dug on JAY 6. Samples from the trenches contained up to 4.8 ppm Au, 718.2 ppm Ag, 14.3% Pb and 3.08% Zn.

Further prospecting and sampling was done in 1983.

ROY GROUP

Logan Mines Ltd.	Silver, Lead,
2830 West 37th Ave.,	Zinc, Gold
Vancouver, B.C. V6N 2T6	95 E/12
	$61^{o}37$'N,$127^{o}40$'W

REFERENCES

Gabrielse and others (1973).

DIAND assessment report 081552.

PROPERTY

ROY 1-17, RON 1.

LOCATION

The property is 50 kilometres south of Tungsten, NWT.

HISTORY

The ROY claims were staked in 1979 and the RON in 1981. In 1980 and 1981 the claims were mapped and geochemical and geophysical surveys done.

DESCRIPTION

The claims are underlain by carbonates of the Rabbitkettle Formation, which apparently unconformably overlies the coarse clastics and carbonates of the Sekwi Formation. Numerous small aplitic dykes cut these strata. A large Cretaceous intrusion lies 3 kilometres south of the ROY claims. Three faults have been mapped on the property, one marked by a zone of brecciation up to 20 metres in width.

Silver, lead and zinc sulphides are found in this breccia as massive lenses and fracture fillings.

CURRENT WORK AND RESULTS

A total of 154 soil samples were taken from two grids and analysed for gold, silver, lead and zinc. Permafrost prevented the excavation of deep trenches in these areas.

NEWLINE CLAIM

D. Taylor	Lead, Zinc,
c/o Watson Lake	Copper, Silver
Yukon Territory	95 E/11
	$61^{o}33$'N,$127^{o}30$'W

REFERENCES

Gabrielse and others (1977).

DIAND assessment report 081651.

PROPERTY

Newline 1.

LOCATION

The claim is 75 kilometres southeast of Tungsten.

HISTORY

The claim was staked in 1983.

CURRENT WORK AND RESULTS

Samples taken from two trenches blasted in gossanous limestone contained up to 14.80% Zn, 3.56% Pb, 0.89% Cu, and 30.1 ppm Ag.

PROSPECTING PERMITS 837, 839-845.

Horley E. Pyett	Diamonds
263 Lake Avenue	95 O/14, 96 B/4
Kelowna, B.C.	63°52'N,123°15'W

REFERENCES

Cook and Aitken (1977), Douglas and Norris (1962).

DIAND assessment report 081631.

PROPERTY

Prospecting Permits 837, 839-45.

LOCATION

The permits are northwest of Blackwater Lake, 80 kilometres north of Wrigley, NWT.

HISTORY

The permits were acquired in 1981.

DESCRIPTION

The geology of the permit area consists of a sequence of isoclinically folded coarse and fine grained Cambrian clastics overlain by the massive bedded dolostones of the Mount Kindle Formation. Devonian carbonates overlie the Mount Kindle Formation. These strata outcrop along the McConnell Range. The valleys have been covered by glacial till up to a depth of 41 metres.

CURRENT WORK AND RESULTS

The permits were explored by geochemical prospecting, mapping and heavy mineral sampling. Kimberlite outcrops were not found, although chrome diopsides and pyrope garnets were found in the aluvial samples.

PROSPECTING PERMITS 732-733, 735-736

Diapros Canada Ltd.	Diamonds
Box 28, Toronto Dominion Centre	96 B/4, 96 C/1
Toronto, Ontario M5A 1B8	64°07'N,124°00'W

REFERENCES

Cook and Aitken (1977), Douglas and Norris (1968), McCallum (1976), Rutter and Boyden (1972).

DIAND assessment report 081636.

PROPERTY

Prospecting Permits 732, 733, 735 and 736.

LOCATION

The permits are 100 km south-southeast of Fort Norman.

HISTORY

An airborne magnetic survey was flown in the spring of 1979 over the area now covered by the permits. The permits were acquired in 1980.

DESCRIPTION

The permits lie within the north-trending, deeply dissected plateau of the McConnell Range. Maximum elevations are approximately 1000 metres with steep slopes rising as much as 300 metres above the valley floor.

Glacial drift blankets most of the area with Devonian and Ordovician limestones and dolostones outcropping usually on the large plateaus.

There have been at least two Laurentide ice advances from the east (Rutter and Boyden, 1972). The first and most extensive is exposed as grey-black stony till containing shale fragments derived from the lowlands east of the McConnell Range.

The second, is recorded as surface deposits of light-grey-brown calcareous till indicative of local derivation, and some Precambrian igneous and metamorphic boulders that have their source some 300 km to the east.

CURRENT WORK AND RESULTS

A total of 2400 glacial sediment samples collected at 100-metre intervals along lines 100 metres apart determined that the distribution of kimberlitic minerals in the area had no regular pattern and that the type and number of kimberlitic minerals vary considerably from one sample site to another. A total of 53 bore holes were drilled using a J.K.S. Smit Winkie to find the nature and thickness of till cover. No work was done in 1983.

SPANIEL 1-9 CLAIMS

Petra-Gem Exploration Ltd. — Diamond
200-3540 W. 41st Ave. — 106 A/3
Vancouver, B.C. — $64^{o}15'N,129^{o}29'W$

REFERENCES

Blusson (2905), Oldershaw (1978).
DIAND assessment report 080826.

PROPERTY

SPANIEL 1-9.

LOCATION

SPANIEL 1-9 are about 193 km southwest of Norman Wells, NWT. and 306 km north-northeast of Ross River, YT.

HISTORY

The claims were staked in December 1976 and optioned to C.F. Mineral Research in 1979.

DESCRIPTION

The claims lie on the western flank of the Mackenzie Arch and are underlain by carbonates and shallow-water clastics of Cambrian-Ordovician age. Intruded into this sequence is a chlorite-biotite diatreme.

According to Petra-Gem the diatreme is 610 m in diameter and contains fine to coarse breccia of rounded, altered ultramafic and carbonate fragments in a blue-grey matrix. There is a pyritic halo around the top and sides of the diatreme. Minor chalcopyrite is associated with the pyrite.

Geologists from Petra-Gem describe hand specimens of the diatreme breccia as follows:

> Breccia in the central phase has the appearance, in hand specimen, of an altered volcanic agglomerate. Upon closer examination it is noted that most fragments are rounded and of two types, grey to white carbonate inclusions and dark green to dull green ultramafic fragments. These "autoliths" which are believed to originate in the explosion of immiscible material in the original ultramafic magma, are characterized by the "nuclei" of rounded phlogopite mica books. Weathered surfaces of the breccia appear strongly pitted through erosion of these phlogopites and corrosion of carbonate inclusions. Both matrix and autoliths in the breccia are very strongly altered to clay minerals, chlorite and serpentine. Other minerals identifiable in hand specimen are phenocrysts of augite and opaque oxides, carbonate, pyrite and chalcopyrite. In this section other minerals are pseudomorphs of carbonate after olivine and possibly melilite, chlorite, serpentine, murky equant grains thought to be perovskite, possible ilmenite and minerals of secondary origin, tremolite, quartz, plagioclase, sericite and carbonate. In pan concentrates, other minerals seen were magnetite, chromite (?), barite, zircon and pyrite. Some areas of the breccia appear to be sorted and bedded with fine "sedimentarly" laminae; this is thought to result from fluidization of the material during emplacement of the diatreme.

Petra-Gem concludes that the emplacement of the diatreme was prior to or during the deposition of the Mt. Kindle Group and that the diatreme has many features characteristic of kimberlitic breccia pipes.

CURRENT WORK AND RESULTS

Five samples, each weighing approximately 35 kg, were collected from the diatreme and tested for their microdiamond content.

Four samples did not have any microdiamonds whereas two microdiamonds were identified under the binocular microscope in the residual concentrate from the remaining sample.

PROSPECTING PERMIT 885

G. Ryznar — Lead, Zinc
4405 Glen Canyon Drive — 95 J/13
N. Vancouver, B.C. V7N 4B4 — $63^{o}00'N,123^{o}45'W$

REFERENCES

DIAND assessment report 081632.

PROPERTY

Prospecting Permit 885.

LOCATION

The permit is 160 kilometres northwest of Fort Simpson, NWT.

HISTORY

Lead and zinc have been explored for in this area since 1972 by Cominco Ltd., Giant Yellowknife Mines, Aquitaine Canada Ltd. and Union Oil. Cominco Ltd. drilled several lead-zinc showings in 1974 and 1975 and retain claims in the area.

DESCRIPTION

The permit is underlain by a carbonates and minor clastics of rocks from Middle to Upper Devonian age. Fine-grained clastics predominate in the Upper Devonian. The Camsell Thrust is marked by an escarpment striking north-south along the eastern edge of the permit.

Silver, zinc and lead showings were found in the Nahanni Formation as veins, disseminations and infilling breccias.

CURRENT WORK AND RESULTS

The area was prospected and mapped at a scale of 1:4800.

FALCON CLAIM

J. Dodge	Barite
c/o Ross River, Y.T.	105 P/10
	$63^{o}44$'N,$128^{o}55$'W

REFERENCES

DIAND assessment report 081677.

PROPERTY

FALCON 1.

LOCATION

The claim is 10 kilometres south-southwest of Godlin Lakes, NWT.

HISTORY

FALCON 1 was staked in 1981.

DESCRIPTION

The claim is underlain by carbonates of the Landry Formation. A barite bed 6 m thick within this formation outcrops for a length of 650 metres.

CURRENT WORK AND RESULTS

Specific gravity determinations were done on 10 grab samples taken from a barite bed.

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CHAPTER 4: ARCTIC ISLANDS REGION

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INTRODUCTION

The Arctic Islands Region corresponds to the District of Franklin; it includes the Arctic Islands and Melville Peninsula.

The Arctic Archipelago includes all or parts of several major geological provinces. To the south and east it is bound and in part underlain by Precambrian rocks of the Canadian Shield as exposed in the Minto Arch, the Boothia Uplift, and on Melville Peninsula, eastern Devon Island, Ellesmere Island, and most of Baffin Island (Fig. 4-1).

The north-trending Cornwallis Fold Belt, which divides the Arctic Platform and Franklin Geosyncline into eastern and western parts, developed mainly in Silurian and Devonian time in response to periodic faulting caused by movements of the Boothia Uplift. The Sverdrup Basin, which in late Proterozoic and Mesozoic time was superimposed on the folded Franklin Geosyncline, was itself folded in Cenozoic time. Relatively undisturbed Proterozoic sediments occur in several parts of the Arctic Islands, notably Northern Baffin, Victoria, Somerset and Ellesmere Islands. A comprehensive review of the evolution of the Canadian Arctic Islands is given by Kerr (1981).

Commercial production of lead-zinc ore from the Polaris Mine on Little Cornwallis Island commenced in March, 1982. It replaced the region's other producing mine, the Nanisivik Mine of northern Baffin Island, as the world's most northerly operating metal mine (see Chapter 2). The larger exploration projects in the Arctic Islands included the search for copper-silver deposits in the Proterozoic Natkusiak Formation basalts of the Shaler Mountains of Victoria Island by Panarctic Oils Ltd. (1982-83), and exploration for base and precious metals in Precambrian gneissic terrain of southeastern Ellesmere Island by Petro-Canada (1983). Petro-Canada also explored coal licences and prospecting permits in west-central Ellesmere Island (1982). In the Borden Rift Zone of northern Baffin Island, Nanisivik Mines Ltd. continued exploration of base-metal targets near their mine and along the Society Cliffs Formation outcrop belt. Petro-Canada explored the adjacent Arctic Bay Formation outcrop belt (1983). In 1982, Borealis Exploration Ltd. drilled and mapped magnetite-iron deposits near Roche Bay, Melville Peninsula. They also undertook metallurgical, geotechnical and environmental studies related to project development. A major part of the 1983 summer work involved airstrip construction.

Several smaller projects involved reconnaissance for kimberlite pipes by Monopros Ltd. and for carvingstone by DIAND's Arctic Islands District Geologist in the Central Arctic and northern Baffin Island. Claim staking was conducted near Hadley Bay (A in Fig. 4-1), Victoria Island, by prospector Bill Reid (copper showings in Glenelg Formation sandstone) and on Kalivik Island near the Polaris mine by Cominco Ltd.

The mineral rights of a large portion of northeastern Ellesmere Island (almost 40,000 sq. km) was removed in June, 1982, by Privy Council order number 1982-1875 as Ellesmere Island National Park Reserve. This includes parts of NTS areas 120 C-F and 340 D, E and H. An assessment of the mineral and hydrocarbon resource potential of this area was recently conducted and published by the Geological Survey of Canada (1981).

Scheduled jet service is available to Resolute Bay, Cambridge Bay, Nanisivik, Frobisher Bay and Hall Beach. Most Arctic settlements have scheduled Twin Otter flights at least once a week. Camp moves and resupply flights for exploration crews are usually by chartered Twin Otters equipped with oversize tires for landing directly on the Arctic tundra. These aircraft are available in Resolute Bay, Frobisher Bay and Hall Beach.

ACKNOWLEDGEMENT

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HIGH ARCTIC - INNUITIAN PROVINCE

The Innuitian Tectonic Province contains the record of a Phanerozoic mobile belt in northern Greenland and the Canadian Arctic Archipelago. Two fundamentally different phases in its development are separated by the Devonian-Carboniferous Ellesmerian Orogeny. The first phase involves the early Paleozoic history, while the second is represented by the Carboniferous to Cenozoic history of the province.

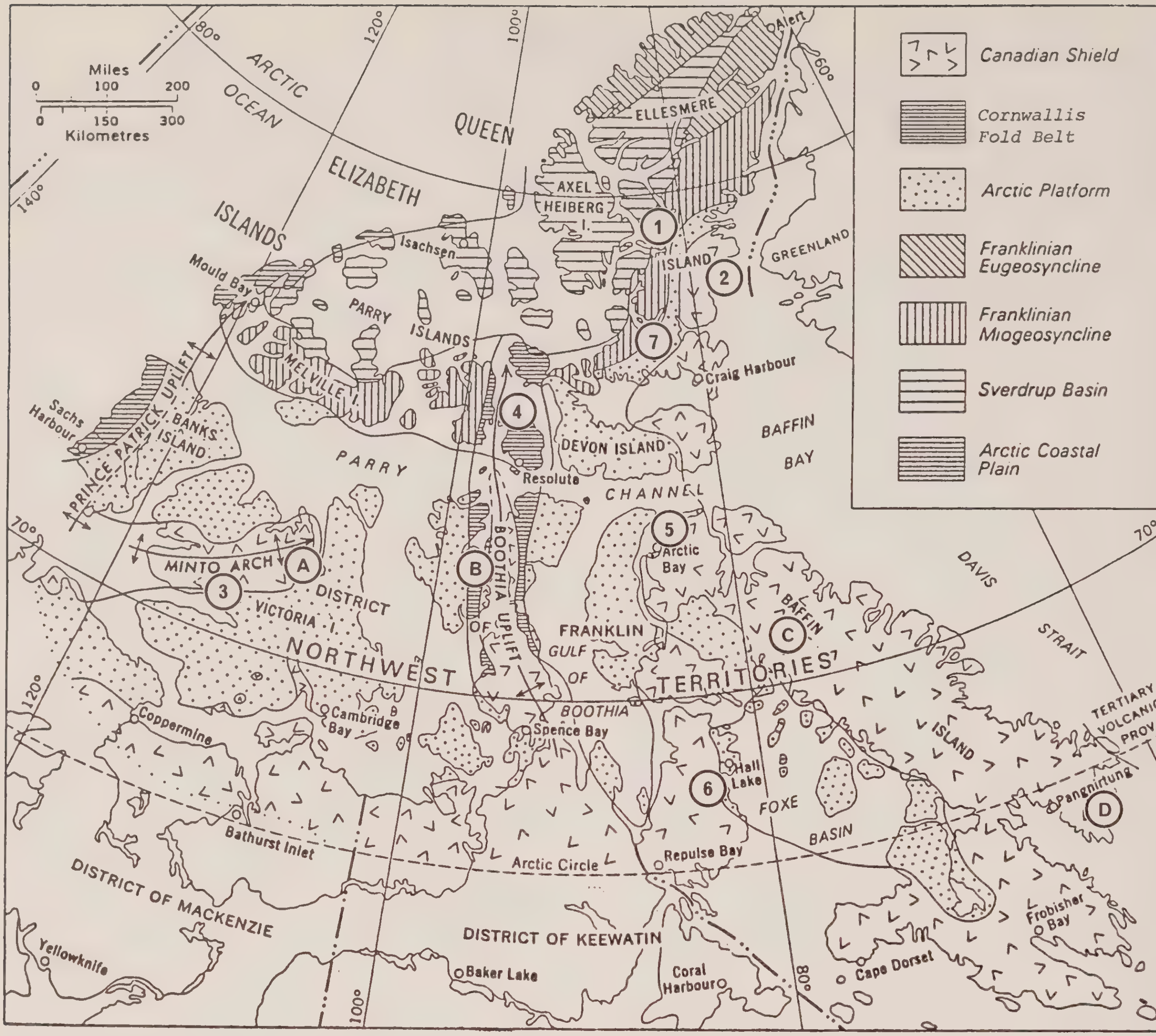

FIGURE 4-1: Geological Provinces of the Arctic Archipelago and explanation of projects

ID	AREA	GEOLOGICAL TARGET	COMMODITY	ORGANIZATION
1.	West-central Ellesmere Island	Lower Paleozoic strata of the Franklin Miogeosyncline	Base metals	Petro-Canada Ltd.
2.	Southeast Ellesmere Island	Precambrian crystalline gneisses	Base and precious metals	Petro-Canada Ltd.
3.	Northwest Victoria Island	Proterozoic Natkusiak Formation volcanics	Copper, silver	Panarctic Oils Ltd.
4.	Cornwallis Island	Lower Paleozoic carbonates of the Cornwallis Fold Belt	Zinc, lead	Cominco Ltd.
5.	Borden Peninsula, Baffin Island	Proterozoic carbonates and shales	Zinc, lead	Nanisivik Mines Ltd. Petro-Canada Ltd.
6.	Roche Bay Melville Peninsula	Prince Albert Group	Iron	Borealis Exploration Ltd.
7.	Stenkul Fiord, Southern Ellesmere Island	Tertiary Eureka Sound Formation - Sverdrup Basin	Coal	Petro-Canada Ltd.

A. WILLYS, BANDIT claims (copper, cobalt)
B. Carvingstone - Flexure Bay and Savage Point
C. Carvingstone - East of Mary River
D. Carvingstone - Southern Cumberland Peninsula

Papers by Kerr (1981) and Trettin and Balkwill (1979) are recommended for a more detailed description of the geological history of the area.

PROSPECTING PERMITS 846 TO 884

WEST-CENTRAL ELLESMERE ISLAND RECONNAISSANCE

Petro-Canada	Base metals
P.O. Box 2844,	49C-F,H
Calgary, Alta. T2P 3E3	77°30'-79°45'N,
	77°00'-85°30'W

REFERENCES

Fortier and others (1963); Gibbins (1984); Gibbins and others (1977); Kerr (1967, 1968, 1976, 1977a, b); Kerr and Thorsteinsson (1972); Morganti (1981); Sangster (1981); Thorsteinsson (1972a-e); Thorsteinsson and Tozer (1970); Trettin (1978, 1979); Trettin and Balkwill (1979).

DIAND assessment report 081649.

PROPERTY

Thirty-nine prospecting permits (846-884) totaling 247,852 ha. (49 C/9,16, D/12,13, E/4-6,12,14, F/1,2,7-3, H/3,4,9).

LOCATION

The west-central Ellesmere Island mineral reconnaissance was conducted from a base camp at Strathcona Fiord (78°33'N, 81°57'W), about 30 km east of the centre of the project area (Figs. 4-1 (no. 1) and 4-2) and 500 km northeast of Resolute Bay, Cornwallis Island. This camp was shared with geologists from the Petro-Canada coal group, (see pages 135-150). The project area is extremely large; approximately 12,250 km^2 of permitted and open ground in a 100 by 250 km area were explored.

The area lies within the Innuitian Province and includes parts of several physiographic regions (Fig. 4-3).

HISTORY

Southwestern Ellesmere Island was mapped at reconnaissance scale by the Geological Survey of Canada in 1955 as part of Operation Franklin (Fortier and others, 1963). The area was mapped in more detail in the early 1960's and 1:250,000 scale maps are available for all of the area except 49D - Vendom Fiord (Thorsteinsson, 1972a-d; Kerr and Thorsteinsson, 1972).

In the early 1970's Trettin measured several sections of lower Paleozoic strata in the area to integrate the stratigraphy and depositional history of the "eugeosynclinal" terrains of northern Ellesmere Island (Hazen Trough) with "miogeosynclinal" terrains of central Ellesmere Island (Trettin,1978, 1979).

Cominco Ltd., Cordilleran Engineering Ltd. (on behalf of Kapvik Exploration Ltd.) and Great Plains Development Ltd. (now Norcen Energy Ltd.) did regional exploration of the Franklin Miogeosyncline of western and central Ellesmere Island in 1974 (Gibbins and others, 1977, p. 60-64). Great Plains Development Ltd. discovered and staked several lead-zinc showings in carbonates of the Ordovician Copes Bay Formation of Judge Daly Promontory.

In 1981, Petro-Canada geologists studied the mineral potential of northwestern Ellesmere Island from camps at Tanquary Fiord and Eureka. An economically unimportant copper occurrence on Hare Fiord was found to be restricted to a thin interval of Cambrian Grant Lake Formation cherts (Gibbins, 1984, p. 110-111). A geochemical survey produced a number of anomalies, the most significant of which were zinc anomalies from rock samples of the Cape Phillips Formation (Ordovician-Devonian) shale. It was concluded that this strata has a potential as a host of economic quantities of lead and zinc. The Grant Land and Hazen Formations (Cambrian-Silurian) contained copper and zinc geochemical anomalies, respectively.

It was recommended that further investigation of these strata be conducted in 1982. It was also suggested that the Allen Bay Formation, the facies equivalent of the Cape Phillips Formation, be assessed for possible carbonate-hosted lead-zinc deposits and that the study be restricted to areas in which deposits could ultimately be exploited if found.

The 39 prospecting permits were obtained by 103912 Canada Inc. (a subsidiary of Petro-Canada) at the end of January, 1982; they were relinquished at the end of January, 1983.

DESCRIPTION

The project area includes a large section of the Central Ellesmere Fold Belt (southeastern Franklin Miogeosyncline) and a strip of the adjacent stable shelf (Arctic Platform) along its eastern margin (Fig. 4-4) (Trettin, 1978 and Trettin and Balkwell, 1979). The Composite stratigraphic section of the southeastern Franklin Geosyncline is presented in Table 4-1 from Kerr (1967, 1968 and 1976). To the northwest a thick section of clastic sediments of the

FIGURE 4-2: Petro-Canada prospecting permits Ellesmere Island: 846-884 are 1982 work and 914-956 are 1982-83 work

Imina, Eids and Red Canyon River Formations are interpreted as 'flysch, transitional and molasse phases of a clastic wedge of northerly provenance' (Trettin, 1978, p. 1 and Fig. 4-5).

Paleozoic Franklin Miogeosyncline:

The Franklinian Geosyncline was a site of pronounced subsidence and is divisible into three paleogeographic belts that shifted with time. These are: (1) a southeastern shelf, margin and slope and (2) the central Hazen Trough, that form the miogeosyncline, part of the geosyncline, and (3) a complex northwestern belt that was the site of coastal plain, shelf, and volcanic island arc environments (the eugeosyncline). The Pearya Geanticline is the inferred source area for the clastic sediments of the northwestern coastal plain and the bulk of the clastic sediments in the Hazen Trough (Fig. 4-5).

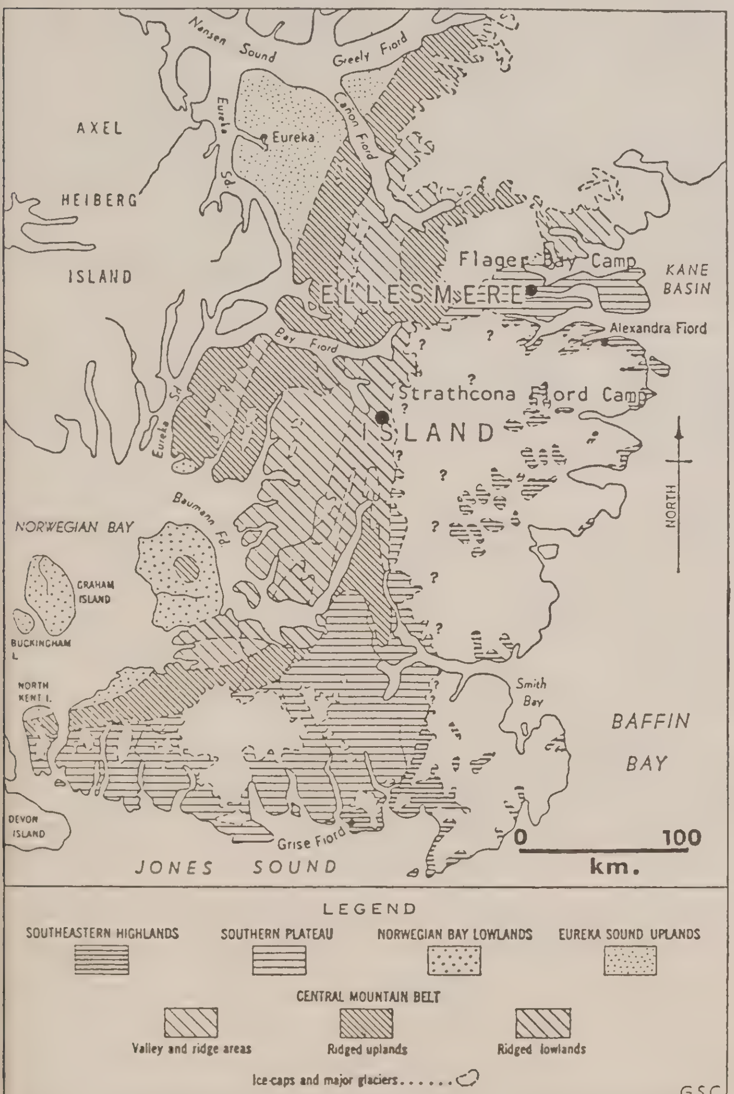

FIGURE 4-3: Physiographic divisions of southern Ellesmere Island (from Roots in Fortier and others, 1963)

On northern Ellesmere Island, early Cambrian to Devonian sediments were deposited in the Hazen Trough and its adjacent slope and shelf areas. Two diachronous depositional phases are distinguished: an early Cambrian to late Silurian pre-flysch phase and a Silurian to early Devonian flysch phase (Trettin, 1978). Strata include the dominantly clastic Grant Land, Hazen and Imina formations (Trettin and Balkwill, 1979).

South of the trough is a belt of Lower to Middle Paleozoic strata that is appoximately 13,000 metres thick. This consists of a lower succession of Cambrian clastics (Ellesmere Group) and succeeding carbonates. Overlying carbonates include the Cambrian Scoresby Bay and Parrish Glacier Formations and the Lower Ordovician Copes Bay Formation. These are equivalent to strata of similar age on the stable platform to the east (Thorsteinsson and Tozer, 1970).

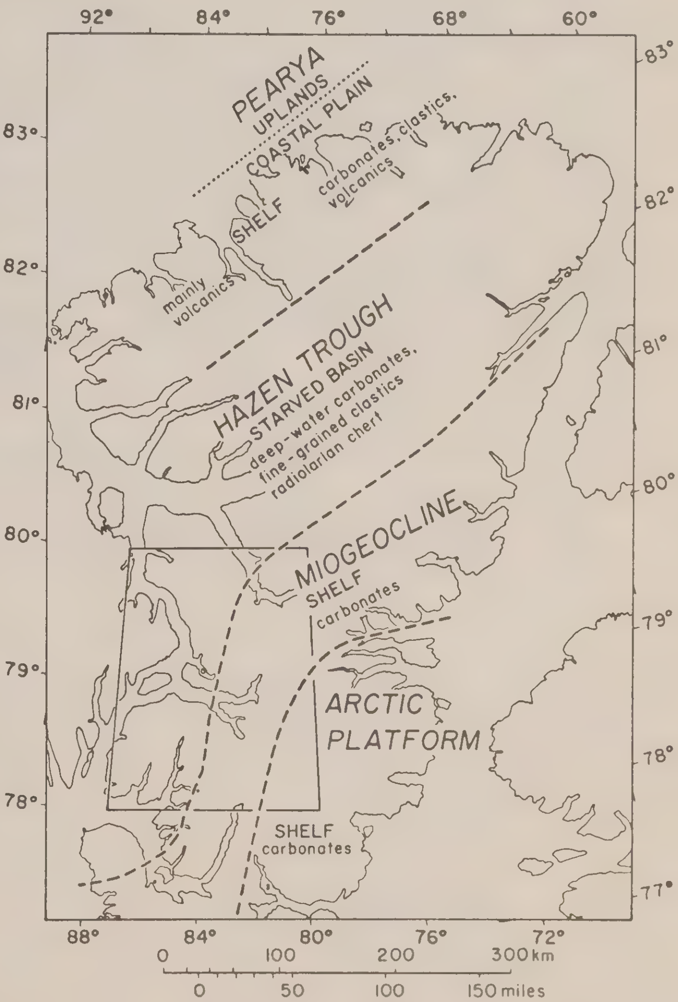

FIGURE 4-4: Depositional framework of northern and central Ellesmere Island during late Ordovician (early Ashgillian) times (from Trettin, 1978)

TABLE 4-1: TABLE OF FORMATIONS, CENTRAL ELLESMERE FOLD BELT (from Kerr, 1967, 1968 and 1976)

		FRANKLINIAN MIOGEOSYNCLINE								
		NORTHWESTERN DIVISION (composite)			CENTRAL DIVISION (composite)			SOUTHEASTERN DIVISION (composite)		
PERIOD	EPOCH	Formation or Group	Lithology	Thickness in Feet (metres)	Formation or Group	Lithology	Thickness in Feet (metres)	Formation or Group	Lithology	Thickness in Feet (metres)
DEVONIAN	Upper	?	?	?	*Okse Bay*	Sandstone, quartzose; some siltstone, non-calcareous; varicoloured	Up to 6150 (1875) preserved	*Okse Bay*	Sandstone, quartzose; some siltstone, non-calcareous; varicoloured	Up to 6150 (1875) preserved
DEVONIAN	Middle	*Eids ?*	Laminated calcareous mudstone, minor sandstone and siltstone (mudstone unit of Trettin, 1973)	Up to 6000 (1829) preserved	*Blue Fiord*	Limestone, shaly, commonly reefal	0-3955 (0-1205)	*Bird Fiord*	Limestone, dolomite; sandy and shaly	0-1415 (0-431)
DEVONIAN	Middle							*Blue Fiord*	Dolomite, thick bedded; minor limestone and quartz sandstone	145-2430 (44-741)
DEVONIAN	Lower	—?—	—?—	—?—	*Eids, Vendom Fiord, Imina and unnamed Formations*	Clastic units including calcareous mudstone, sandy and silty turbidites and red and green siltstone; minor carbonates	2000-3000 (610-914+)	*Vendom Fiord*	Red quartz and carbonate sandstone	0-1300 (0-396)
DEVONIAN	Lower							*Eids and unnamed Formation*	Calcareous mudstone; red and green siltstone	0-1030+ (0-314+)
SILURIAN	Pridolian	*Imina*	Flysch-like succession of calcareous and dolomitic sandstone, siltstone and shale; minor conglomerate and carbonate breccia	3000-9000 (914-2743)	*Cape Phillips*	Cape Phillips - shale, shaly limestone, limy siltstone; graptolitic	0-2200 (0-671)	*Cape Phillips*	Cape Phillips - shale, shaly limestone, limy siltstone, graptolitic	0-1325+ (0-404+)
SILURIAN	Ludlovian									
SILURIAN	Wenlockian	*Cape Phillips and Hazen Formations*	Shale, shaly limestone, limestone, chert, graptolitic; includes carbonate-chert-shale facies of Trettin (1973)	0-3100 (0-945)	*Allen Bay-Read Bay; undivided*	An undivided succession; lower part mainly dolomite; upper part mainly limestone, commonly with dolomite; shaly limestone, sandstone and in places reef breccia	0-9400? (0-2865?)	*Allen Bay-Read Bay; undivided*	An undivided succession; lower part mainly dolomite; upper part mainly limestone, commonly with dolomite, sandstone and shale	950-6325 (290-1928)
SILURIAN	Llandoverian									
ORDOVICIAN	UPPER CINCINNATIAN	*Irene Bay (?)*	Limestone, dark grey, shaly interbeds; fossils rare	675+(206+)	*Irene Bay*	Limestone, shaly, medium grey, weathers greenish, recessive; fossils common	140-1050 (43-320)	*Irene Bay*	Limestone, shaly, medium grey, weathers greenish	120-270 (37-82)
ORDOVICIAN	UPPER CINCINNATIAN	CORNWALLIS GROUP: Thumb Mountain	*Limestone, dark grey, bluff-forming.*	?—1800	CORNWALLIS GROUP: Thumb Mountain	*Limestone, partly dolomite, dark grey-brown, thick-bedded, slightly rusty; weathers medium grey, bluff-forming*	850—2300	CORNWALLIS GROUP: Thumb Mountain	*Limestone, partly dolomite, dark grey-brown, thick-bedded, slightly rusty; weathers medium grey, bluff-forming*	1100—1650
ORDOVICIAN	MIDDLE MOHAWKIAN	CORNWALLIS GROUP: Bay Fiord	*Limestone, shaly and sandy, dark grey to light grey, recessive*	1450—2000 +	CORNWALLIS GROUP: Bay Fiord	*Limestone, silty and sandy, and shaly, dolomite in southern sections, anhydrite common, recessive*	780—1800	CORNWALLIS GROUP: Bay Fiord	*Limestone, thin-bedded, silty, sandy and shaly, lower part commonly anhydritic, recessive*	900—1700
ORDOVICIAN	LOWER	Eleanor River	*Limestone, shaly and silty, thick-bedded, bluff-forming*	?—775	Eleanor River	*Limestone, medium grey, buff-weathering, thick-bedded, bluff-forming,*	775—2000 +	Eleanor River	*Limestone, medium grey, buff-weathering, thick-bedded, resistant bluff*	700—2600
ORDOVICIAN	LOWER	Disconformity	? Erosion or non-deposition ?		Baumann Fiord	C *gypsum-anhydrite, white* B *limestone, resistant* A *gypsum-anhydrite, white*	0—2560	Baumann Fiord	C *gypsum-anhydrite, white* B *limestone, resistant* A *gypsum-anhydrite, white*	100—970
ORDOVICIAN	LOWER	Copes Bay	*Limestone, shaly and sandy, sandy dolomite, no gypsum*	2825	Copes Bay	*Limestone shaly and silty, minor gypsum, flat-pebble conglomerate, mud cracks, ripple marks,*	2350 +	Copes Bay	*Limestone, silty and shaly, often gypsiferous, flat-pebble conglomerate common*	1800—4800
CAMBRIAN	UPPER	Disconformity	Erosion or non-deposition							
CAMBRIAN	MIDDLE	Parrish Glacier	limestone, dolomite, quartz sandy and silty, varicoloured	2125	Parrish Glacier	in north, limestone and dolomite, very sandy, varicoloured: in south sandstone, quartzose, minor limestone	1500+	Parrish Glacier	limestone, shale siltstone fine grained sandstone, thin-bedded, varicoloured	870-1510
CAMBRIAN	LOWER	Scoresby Bay	dolomite, medium to dark grey, limestone interbeds, shaly, basal coarse boulder conglomerate	2825	Scoresby Bay	dolomite, limestone and shale interbeds, medium to dark grey	2530	Scoresby Bay	dolomite, light to dark grey, resistant	850-1850
CAMBRIAN	LOWER	Ellesmere Group: Kane Basin	phyllite, minor slate, black, weathers rusty brown	1300+	Ellesmere Group: Kane Basin	siltstone, sandstone, shaly, thin-bedded	820	Ellesmere Group: Kane Basin	sandstone, fine-grained, shaly, minor dolomite, thin-bedded	275-530
CAMBRIAN	LOWER	Ellesmere Group: Rawlings Bay	sandstone, quartzose, shaly, minor phyllite	2225	Ellesmere Group: Rawlings Bay	sandstone, quartzose, micaceous, shaly in places, thick-bedded	1780	Ellesmere Group: Rawlings Bay	sandstone, quartzose, pebbly sandstone conglomerate, vari-coloured	930-3131
CAMBRIAN	LOWER	Ellesmere Group: Ritter Bay	phyllite, slate, dark grey, minor quartz sandstone	1100+	Ellesmere Group: Ritter Bay	phyllite, minor slate, dark grey to black, white bloom on weathering	1400			
CAMBRIAN	LOWER				Ellesmere Group: Archer Fiord	quartz sandstone, pebbly sandstone	300			

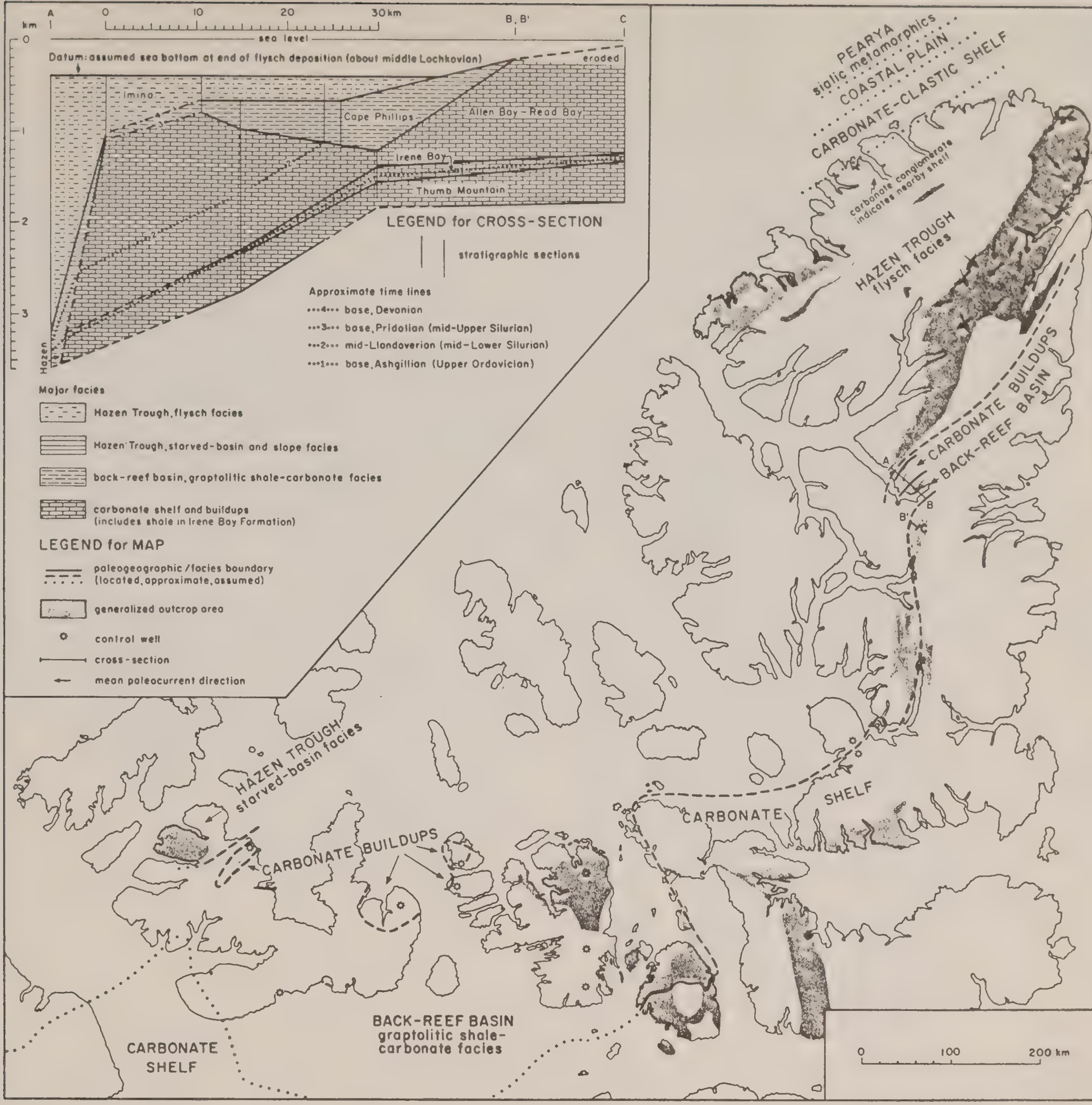

FIGURE 4-5: Facies relationships and paleogeography during the middle Silurian (from Trettin and Balkwill, 1979)

Overlying this lower succession are Ordovician evaporites (Baumann Fiord, Bay Fiord Formations) and carbonates (i.e. the Cornwallis Group). This is followed by an Upper Ordovician to Upper Devonian sequence (Fig. 4-5) of marginal carbonates (Allen Bay-Read Bay Group, and the Blue Fiord-Bird Fiord Formations) and their basinal facies equivalents (Cape Phillips Formation shales and Eids Formation flysch) (Thorsteinsson and Tozer, 1970).

The dominantly carbonate Ordovician to Devonian succession grades stratigraphically upward, as well as northwesterly and westerly, into dominantly molasse-type clastic rocks (Fig. 4-5 and Table 4-1) of the Bird Fiord Formation, Melville Island (in western Arctic) and Okse Bay Formation (in eastern Arctic) (Thorsteinsson and Tozer, 1970).

Paleozoic Franklinian Eugeosyncline:

Franklinian eugeosynclinal rocks are found along the northwest coast of Ellesmere Island and consist of Middle Ordovician or older carbonate-chert-keratophyre assemblages. Overlying this is a Middle Ordovician to Late Silurian sequence of chert-pebble

FIGURE 4-6: Geology eastern Ellesmere Island (from DIAND assessment report 081743)

LEGEND

CAMBRIAN/ORDOVICIAN			
	CO	Cambro-Ordovician Formations	dolomite, limestone, shale
		unconformity	
NEOHELIKIAN			
	Tg	Thule Group	sandstone, siltstone, basalt, stromatolitic dolomite
		non-conformity	
APHEBIAN?			
	H	Post-Archean Plutonic Rocks	granite, granodiorite, tonalite, migmatite
		intrusive contact	
ARCHEAN?			
	A	Alexandra Supergroup	
	Agg	Glentworth Group	psammo-pelitic gneiss, pelitic gneiss, minor marble (molasse facies)
	Adg	Digarmulen Group	mafic metavolcanic, tonalite, pelitic gneiss, sulphide-facies iron formation (eugeosynclinal facies)
	Acg	Cobourg Island Group	quartzite, psammo-pelitic gneiss, minor marble (platform facies)
	Aig	Inglefield Group	calcitic marble, psammo-pelitic gneiss, pelitic gneiss (miogeosynclinal facies)
		fault or anatectic contact	
	K	Devon Island Gneiss Complex	augen gneiss, orthogneiss, orthopyroxene gneiss, migmatite

MINERAL OCCURRENCES

Iron sulphides	●	Sulphide-facies iron formation
	○	Contact metasomatic iron sulphides
Copper occurrences	△	Malachite stain
	▲	Disseminated chalcopyrite
	⊛	Disseminated chalcopyrite and molybdenite
Skarns	☆	Scheelite skarn
	★	Arsenide skarn
Vein mineralization	⬤	Copper, nickel, cobalt and iron sulphides with gold and silver
Barium occurrence	□	Barite, barito-calcite, calcite.

conglomerates, laminated felsic flows and tuffs, limestone and dolomite (Cape Discovery Formation) and volcanic flows, breccias and tuffs (M'Clintock Formation). Younger strata include shales, siltstones and sandstones. Near the top of the sequence are the calcareous sandstones, siltstones and shales of the Imina Formation.

Metamorphism and structural deformation are variable, both being most intense along the western edge of the eugeosyncline. The area may have been affected by orogeny and uplift prior to the Middle Devonian, as well as by the Ellesmerian Orogeny.

Sverdrup Basin:

The Sverdrup Basin is a successor basin superimposed on the Franklin Geosyncline. It contains an essentially concordant succession up to 13,000 m thick of Lower Carboniferous to Tertiary, marine and nonmarine sedimentary rocks, basalt flows and gabbro dikes and sills. Strata of the Sverdrup Basin were folded and faulted during the Cenozoic Eurekan Orogeny along trends that are approximately aligned with older structures. In addition to deformation, piercement bodies of Carboniferous evaporites were emplaced in parts of the Sverdrup Basin.

Structure:

The main deformation events of the Innuitian Tectonic Province are as follows:

1) Precambrian Orogeny: Basement strata once

considered part of the Franklinian Geosynline are now interpreted as deposits of a Helikian to early Hadrynian shelf-basin, some of which show evidence of involvement in a Grenville-age orogeny (Trettin and Balkwill, 1979).

2) Middle Ordovician deformation: Near M'Clintock Inlet, northwestern Ellesmere Island, a Middle Ordovician deformation is indicated by an angular unconformity beneath the Cape Discovery Formation.
3) Caledonian-age orogeny: The Caledonian Orogeny of Greenland coincides approximately with three south-trending arches: an area in east-central Ellesmere Island, the Boothia Uplift and the Rens Fiord Uplift. These were elevated during the early Devonian, or late Silurian and early Devonian. In the first belt, clastics, including many red-beds (i.e., Vendom Fiord Formation) were unconformably deposited over older sediments (Trettin and Balkwill, 1979).
4) Ellesmerian Orogeny: This was the most extensive and intensive deformation and it progressed from north to south producing three fold belts (Fig. 1 of Trettin and Balkwill, 1979).
   i) The Northern Ellesmere Fold Complex began by the Middle Devonian and was completed before late Early Pennsylvanian.
   ii) The Hazen Fold Belt includes the deformed strata on the northeastern part of the Hazen Trough (Fig. 4-4).
   iii) Central Ellesmere Fold Belt - The deformation of the Central Ellesmere Fold Belt, which includes the project area, probably began after the deposition of the 'clastic wedge' in latest Devonian or earliest Carboniferous time and continued until Early Pennsylvanian time. The deformation was of skin type and characterized by extensive concentric folds controlled by competent carbonate units. The main decollement must occur in Proterozoic strata close to the crystalline basement, but is not exposed. Crustal shortening is less than in the Hazen Fold Belt (Trettin and Balkwill, 1979, p. 759).
5) Melvillian Disturbance: This early Permian phase is marked by folding in northwestern Melville Island and faulting in the Trold Fiord region of Ellesmere Island.
6) Eurekan Orogeny: The latest Cretaceous to middle Tertiary deformation was most intense in Axel Heiberg and Ellesmere Islands. Faulting predominated, with large vertical displacements occurring in conjunction with thrust and normal faulting and broad arching. Horizontal displacement is minor. In central Ellesmere Island thrust faults, commonly <u>en echelon</u>, generally strike northeast, dip northwest and extend for more than 160 kilometres. The early extensional phase of the Eurekan Orogeny is marked by continental tholeiite flows in Late Cretaceous strata on northern Ellesmere and by dike swarms throughout Sverdrup Basin.

CURRENT WORK AND RESULTS

Objectives:

The principal objective of the 1982 program was to locate and assess exploitable occurrences of economic minerals. Lead and zinc were main targets as the region has potential for both shale-hosted (sedex) and carbonate-hosted (Mississippi Valley-type) deposits. Sangster (1981) suggested that slow sedimentation rates, euxinic conditions and possible synsedimentary faulting in the Cape Phillips Formation of the region, make it a potential host of lead-zinc minerals.

Both Howard's Pass (low silver, copper, barite and iron and low temperature) and MacMillan Pass (metal zoning, stockwork zone, etc.) types of shale-hosted lead-zinc deposits (Morganti, 1981) were sought. Mississippi Valley-type deposits were explored for on both sides of the Cape Phillips Formation shale - Allen Bay and Read Bay Formation carbonate facies front, which trends northerly through the project area and the Cornwallis Lead-Zinc District to the southwest (Kerr, 1977b), and in Devonian biostromal platform carbonates which host the ore deposits of the Pine Point Lead-Zinc District. Red-bed clastic rocks were prospected for copper and uranium.

Geochemistry:

Several hundred silt samples, mainly stream-sediments, were collected in conjunction with reconnaissance mapping and prospecting, while detailed rock and soil sampling was done in areas of mineral showings and gossans. Threshold and anomalous limit levels were determined for each element and major rock type (Table 4-2). Eighteen samples were anomalous in two or more elements. Single element

TABLE 4-2: THRESHOLD AND ANOMALOUS GEOCHEMICAL MEASUREMENTS OF SILT SAMPLES, WEST-CENTRAL ELLESMERE ISLAND

	Shale Group		Carbonate Group	
Element	Threshold	Definitely Anomalous Limit	Threshold	Definitely Anomalous Limit
Copper	64	87	40	70
Lead	21	27	22	74
Zinc	250	500	80	180

anomalies included 44 zinc, 13 lead and 4 copper assays. In general, the zinc and copper-zinc anomalies are related to hydrozincite showings in shales of the Devon Island Formation and Cape Phillips Formation. The anomalous lead and lead-zinc samples were collected downstream from low-grade galena and smithsonite showings in carbonates of the Thumb Mountain Formation and Allen Bay Formation, mainly in the eastern margin of the project area and the Central Ellesmere Fold Belt. However, numerous showings in the Irene Bay and Mount James area did not produce anomalous stream sediments.

Chip samples and grab samples of hydrozincite-bearing shales contained 0.02-0.5% Zn, less than 0.01% Cu, 1.8% Ba and 2.6 ppm Ag. The results of the geochemical work were not encouraging and only a few weakly anomalous samples are unexplained.

Heavy Minerals:

Fifty-seven reconnaissance and nine orientation samples were collected for heavy mineral analysis. One sample (HM 37), collected on the west side of Trold Fiord, contained anomalous lead and zinc. It was interpreted as having a nearby source, but this source could not be found.

Three samples, one from the north end of Makinson Inlet (HM 64) and two from Eids Fiord and Baumann Fiord (HM 90, HM 96), contain kimberlite indicator minerals; ilmenite, chromite, and/or chrome diopside.

Prospecting and Geological Mapping:

The mapping emphasised the recognition and definition of sedimentary, stratigraphic and tectonics commonly associated with important shale and carbonate-hosted lead-zinc deposits. Criteria included basin-shelf hinge-lines, shale-carbonate facies changes, unconformities, euxinic shales, reefal, brecciated and dolomitized carbonates, clastic red-bed horizons, major structural elements and so on.

Although the project failed to locate any potentially economic mineralization, 130 lead, zinc, barite, and pyrite occurrences were discovered. These included 87 formational and fracture-related hydrozincite showings in shale of the Cape Phillips and Devon Island Formations, 16 showings of Mississippi Valley-type disseminated galena, sphalerite and barite in Allen Bay Formation dolomite, 14 showings of fault- and vein-related galena, sphalerite and barite, and nine barite localities (8 nodular and 1 bedded) in the Devon Island Formation.

Prospecting showed that hydrozincite showings in Devon Island Formation strata are most abundant in the Vendom Fiord-Baumann Fiord areas. Hydrozincite occurs close to nodular barite in the lower part of the formation. Barite occurs at 80 and 300 metres above the base of the Devon Island Formation. It is common west of Mount Low, southeastern Fosheim Peninsula, and near the head of Troll Bay, southern Svendsen Peninsula.

Hydrozincite in the Cape Phillips Formation is most abundant in the spiralis graptolite zone within the medial to upper part of the unit. It is best developed in the thickest sections of this zone in flaggy to platy mudstone and calcareous mudstone near the north end of Trold Fiord.

Eight showings of galena, sphalerite and barite are present as disseminations, fracture fillings and veinlets in a brecciated and cemented facies of the uppermost Allen Bay Formation dolomite west of Irene Bay. Weathered galena has a black coating that can be mistaken for lichen, and honey-brown sphalerite weathers to white or pale brown smithsonite. A grab sample of the best material assayed 5.37% Pb, 1.44% $BaSO_4$; the highest zinc assay was 1.96% Zn with 12.3 ppm Ag. Barite occurs with calcite veinlets in these rocks.

Fault-related galena, sphalerite and barite-bearing veins are found in Thumb Mountain Formation and Allen Bay Formation - Read Bay Formation carbonates of two areas. In the Mount James area (79°12'N, 83°W), sulphides are found in some of the calcite-filled gash veins and associated with numerous crackle veinlets close to a large northeast-trending dip-slip fault that cuts Allen Bay Formation strata in the south and Thumb Mountain Formation strata in the north. The second area is west of Vendom Fiord

where sulphides and barite occur in an area of intense block faulting and carbonate veining within undivided Thumb Mountain Formation and Allen Bay Formation limestones. The best material assayed 11.8% Zn (smithsonite) and 5.14% Pb (galena) found in a one metre square area.

Three small pyrite showings were found in the basal beds of the Tertiary Eureka Sound Formation on the Fosheim Peninsula south of Canon Fiord. Traces of malachite, associated with tetrahedrite, were found in an irregular quartz carbonate vein cutting argillaceous limestones of the upper Hazen Formation in the Caledonian Bay area on the north shore of Canon Fiord, mapped by Trettin (1979).

All of the west central Ellesmere Island prospecting permits were relinquished in January, 1983.

PROSPECTING PERMITS 914-956 AND EASTERN ELLESMERE, COBURG AND EASTERN DEVON ISLANDS RECONNAISSANCE

Petro-Canada	Base metals, precious
P.O. Box 2844	metals, tungsten, barite
Calgary, Alberta, T2P 3E3	29 G, 38 F, G, 39 B-H,
	48 E, H
	$74^{o}30'$-$80^{o}00'$N,
	$74^{o}00'$-$86^{o}00'$W

REFERENCES

Christie (1962a, b, 1967, and 1978); Dawes and others (1982); Frisch (1983); Frisch and Christie (1982); Frisch and Dawes (1982); Frisch and others (1978); Kerr (1972a, b); Krupicka (1973).

DIAND assessment report 081743.

PROPERTY

Forty-three prospecting permits (914-956) totalling 657, 634 ha. (39 E/12,13; F/2,3,6-11,14-16; G/1-3; H/3,4).

LOCATION

The project involved reconnaissance exploration and mapping of Precambrian rocks of southeastern Ellesmere, eastern Devon and Coburg Islands (Fig. 4-1). This area is defined as the Alexandra Subprovince of the Churchill Structural Province of the Canadian Shield. Approximately 95 percent of the area, which corresponds to the northern Davis Highlands physiographic subprovince, is covered by permanent ice caps and glaciers. Bedrock is exposed in rugged coastal terrain and nunataks with up to 1200 metres relief.

The 49 contiguous prospecting permits include 657,634 ha (1,625,050 acres) of rock and icefield between Bache Peninsula (lat. 79^{o} 7.5'N) and Talbot Inlet (lat. 78^{o} N) (Fig. 4-2). Base camps were established at Flagler Bay (1982) and Gale Point (1983) on Ellesmere Island, and at Trelove Inlet on Devon Island (1983).

HISTORY

The accounts of several exploration expeditions include notes on the geology of the eastern coast of Ellesmere Island, however, the first systematic geological mapping was done by R.L. Christie of the Geological Survey of Canada in 1961 (Christie, 1962a, b, and 1967). He mapped the Precambrian rocks of the south shores of Bache Peninsula and Alexandra Fiord using Inuit dog sledges for transportation. Christie (1978) also reported on the geology of eastern Devon Island and Krupicka (1973) described granulite facies rocks from the Truelove Inlet area, northeastern Devon Island. Kerr (1972a, b) compiled 1:250,000 scale maps for the Dobbin Bay - Flagler Bay area (NTS 39 G&H).

In 1977, the Geological Survey of Canada mounted a helicopter-supported reconnaissance mapping of the area that allowed the first access to many inland nunataks of eastern Ellesmere Island (Frisch, 1983; Frisch and others, 1978).

Petro-Canada geologists became interested in the mineral potential of the area from reports of gossans and malachite stainings reported by the Geological Survey of Canada (Frisch, 1983; Frisch and others, 1978). They obtained the 43 prospecting permits in January, 1983 in the name of 103912 Canada Inc., a subsidiary company, and relinquished them in January, 1984.

DESCRIPTION

The Precambrian Shield terranes of Ellesmere, Devon and Coburg Islands constitute the Alexandra Subprovince of the Churchill Structural Province. To the west this basement gneiss complex is unconformably overlain by late Precambrian, Cambrian and Ordovician platformal sediments or covered by extensive ice fields; to the east, the gneisses are bound by the shores of Baffin Bay and Jones Sound. Locally, outliers of gently-dipping Neohelikian Thule Group lie nonconformably on the basement complex.

Geological work by Geological Survey of Canada (Frisch, 1983) and Petro-Canada indicate that there were three major crust-forming events in the project

area:

1) a middle Archean metamorphic/plutonic complex, termed the 'Devon Island Gneiss Complex'.
2) a late Archean or early Aphebian volcano-sedimentary gneiss complex, termed the 'Alexandra Supergroup'.
3) a series of Aphebian plutonic and migmatitic rocks that formed during the Hudsonian orogenies.

The rocks of the Alexandra Subprovince have undergone several periods of intense structural deformation, partial melting, granulite-facies metamorphism and amphibolite facies retrograde metamorphism. Preliminary evidence suggests that the gneisses of Ellesmere Island continue northeastwards and reappear in Inglefield Land, northeastern Greenland (Frisch and Dawes, 1982).

Rock units

Rock types of the basement complex have been briefly described by Frisch (1983) and Petro-Canada geologists (DIAND Assessment Report 081743) (see Table 4-3). The oldest group of rocks, the Devon Island Gneiss Complex of Petro-Canada geologists, are granulite facies orthogneisses that are characterized by widespread retrograde metamorphism, locally intense deformation, garnets in alumino-silicate-free quartzofeldspathic gneisses and mafic gneisses and abundant migmatite, augen, and lit-par-lit gneisses and cataclastic rocks.

The Alexandra Group (Table 4-3) is a package of granulite-facies metasedimentary and metavolcanic rocks that can be traced from Devon Island northwards across Coburg Island and coastal southeastern Ellesmere Island to the limits of Precambrian exposure on Bache Peninsula (Fig. 4-6). In spite of its high-grade metamorphism and anatexis, this group of rocks has retained its stratigraphic character, with distinctive units or marker beds traceable upwards of 40 km.

Allowing for uncertainties of structural repetition, the Alexandra Supergroup includes up to 12,000 metres of pelitic gneiss, psammo-pelitic gneiss, marble, calcsilicate gneiss, quartzite, intermediate to mafic metavolcanics, and sulphide-facies iron formation. These thicknesses are comparable to the maximum estimated thicknesses of supergroups mapped elsewhere: Grenville Supergroup - 10 to 15 km, Blake River Group - 12 km, Akaitcho Group, Wopmay Orogen - 8 to 10 km, Wernecke Supergroup - 13 km, Yellowknife Supergroup - up to 14 km.

White impure quartzite gneisses (Aq) resemble calcite marble from a distance, but are distinguished

TABLE 4-3: TABLE OF FORMATIONS, EASTERN ELLESMERE ISLAND

QUATERNARY		
	Q	glacio-fluvial deposits
----unconformity----		
TERTIARY		
	E	Eureka Sound Formation
----angular unconformity----		
PALEOZOIC		
Cambro-Ordovician strata		
	CO	unsubdivided
----unconformity----		
		diabase
----intrusive contact----		
NEOHELIKIAN		
Thule Group		
	Tg5	Green shale
	Tg4	Thick bedded orthoquartzite
	Tg3	Shale, dolomite, thin bedded sandstone
	Tg2	Amygdaloidal basalt
	Tg1	Sandstone, orthoquartzite, stromatolitic limestone
----non-conformity----		
		diabase
----intrusive contact----		
APHEBIAN?		
	r	Retrograded gneisses
	Hg	Granite
	Hm	Migmatite and granite gneiss
	Hi	Granite injected tonalite and mafic metavolcanic
----intrusive contact----		
	Adi	Metadiabase, metagabbro
	Apx	Pyroxenite
----intrusive contact----		
	Atg	Tonalite, granodiorite
----intrusive contact----		
ARCHEAN?		
Alexandra Supergroup		
	Avo	Intermediate to mafic metavolcanic
	Adm	Dolomitic marble
	Acm	Calcitic marble
	Acs	Calcsilicate gneiss
	Asf	Sulphide-facies iron formation
	Ape	Pelitic gneiss
	Aps	Psammo-pelitic gneiss
	Aq	Quartzite
----anatectic or fault contact----		
ARCHEAN?		
Devon Island Gneiss Complex		
	Ka	Augen gneiss
	Km	Migmatite
	Kt	Tonalite, diorite
	Ko	Orthopyroxene gneiss

by well-jointed cliff faces and by blocky talus fans. Psammo-pelitic gneiss (Aps) is the most common rock type in the supergroup. A rusty weathering phase is related to the alteration of finely divided pyrrhotite (1-2%) to goethite. Pale-brown-weathering aluminosilicate-rich migmatite forms the pelitic gneiss unit (Ape). Cordierite and/or sillimanite are common and characteristic of this rock unit.

Sulphide-facies iron formation (Asf) is a conspicuous but volumetrically restricted unit of the Alexandra Supergroup. It consists of pods, lenses, and layers of semi-massive to massive, coarse crystalline pyrrhotite (30 to 90% Po). The largest massive pyrrhotite horizon occurs a few kilometres east of Alexandra Fiord outpost, where it can be traced in outcrop for about 5 km. Within the horizon are discontinuous sulphide pods and lenses. The lenses measure up to 2 metres thick by 15 metres long.

Gneisses containing disseminated (5% to 20%) pyrrhotite with graphite and biotite form many large stratiform gossans. These horizons grade laterally and vertically into rusty psammo-pelitic gneisses (unit Aps) that contain 1% to 5% pyrrhotite. Some sulphide-facies iron-formation lenses are associated with pelitic gneisses; others occur within tonalite or orthopyroxene biotite gneiss.

Sulphide-facies iron formation is distinguished from other iron sulphide occurrences by:

1) its bedded and stratiform character;
2) its association with other paragneiss units;
3) the presence of graphite, indicating deposition of the original black, pyritic mudstone/greywacke under euxinic conditions.

Calcsilicate gneisses (Acs) contain a calcium-silicate mineral assemblage with or without calcite. Typical calcium silicates at granulite facies include diopside-hedenbergite ($CaMgSi_2O_6$-$CaFeSi_2O_6$), sphene ($CaTiSiO_2,(O,OH,F)$), wollastonite ($CaSiO_3$), meionitic scapolite ($3CaAl_2Si_2O_8CaCO_3$), calcic plagioclase, and apatite ($Ca_5(PO_4)_3$). Other less common mineral species include chondrodite, vesuvianite, grossular garnet, magnetite, serpentine, fluorite, scheelite-powellite and arsenopyrite. Many of these may in fact be related to contact metamorphic or metasomatic processes. Many small gossans on Cadogan Glacier and upper Trinity Glacier that are related to marbles and calcsilicate rocks, are formed from the weathering of of disseminated pyrrhotite (5% to 15%).

White calcitic marble (Acm) is the most easily identifiable meta-sedimentary unit in the Alexandra Supergroup. It is possible to establish the gross geological picture of an area by tracing out calcitic marble bands either from air photographs or from a helicopter. Individual marble layers have been mapped out for 40 km in the Inglefield Mountains. The mineralogy of calcite marble is fairly simple: 80% to 90% white crumbly coarse-grained calcite with 10% to 15% diopside or forsteritic olivine, and accessory phlogopite, graphite, sphene, apatite and wollastonite. Some bands of calcite marble may be distinctly orange, pale blue or pale green. True marble is often interlayered with various calcsilicate gneisses.

Dolomitic marble (Adm) occurs on several nunataks along the north coast of Talbot Inlet, 15 km northwest of Cape Faraday. It most commonly contains 10% to 20% bladed, pale-green talc and medium-grained nodules of green translucent serpentine within a dolomite matrix. These nearly pure dolomitic marbles are interlayered with a variety of magnesian calc-silicate rocks, talc-serpentine-calcitic marble, monomineralic talc-rock and magnetite-paraserpentinite.

Well banded biotite-othopyroxene gneisses that dominate outcrops along the north shore of Talbot Inlet are interpreted as intermediate to mafic metavolcanics (Avo).

Aphebian plutonic igneous rocks and plutonic-textured gneisses are abundant throughout the Alexandra Subprovince of Ellesmere and Devon Islands. They show considerable range in composition (granite to pyroxenite) and metamorphism (amphibolite to granulite facies). The youngest igneous rocks are diabase dike swarms.

Neohelikian sedimentary and mafic volcanic rocks of the Thule Group were deposited in a supracratonic basin nonconformably overlying peneplained Archean and Aphebian basement in coastal southeast Ellesmere Island and northwest Greenland (Frisch and Christie, 1982; Dawes and others, 1982). On Ellesmere Island only the basal 1100 metres of the 4.5-kilometre-thick succession have been preserved. Exposures occur on the top of the mountain peaks between Clarence Head and Cape Combermere. The thickest exposure is at Goding Bay and additional outcrops are at Cape Dunsterville, Paget Point, and Gale Point. The northern limit of the preserved Thule Basin strata

occurs at an isolated exposure near MacMillan Glacier.

Structure

Structural elements in the region include pre- and post-tectonic isoclinal folds, open concentric folds, shear zones, brittle faults, foliations, and compositional banding and layering. Folds have been classified into three categories; the earliest are tight isoclinal pre-foliation folds that are most easily recognized from the air. The second type is concentric, isoclinal to overturned post-foliation folding that is defined by repetition of stratigraphy. Marble units involved in this folding tend to form tectonic breccias and irregular isoclinal folds, while more competent psammo-pelitic and pelitic gneiss units form overturned structures. These units pinch and swell as the axial zone of the folds is approached. The axial zones seem to be the loci for the concentration of sulphide-facies iron formation at Boger Point and the Alexandra Fiord outpost. The third type of fold occurs as regional-scale low-amplitude warps with fold axes at a high angle to foliation.

Recessive shear zones are common in the Devon Island Igneous Complex. However, the Alexandra Supergroup and Thule Group rocks are displaced along brittle faults that are much narrower than the shear zones. Many of these brittle faults also displace Paleozoic and Tertiary strata. Jones Sound and most of the eastern Ellesmere Island fiords are Miocene grabens formed as a result of displacement on these brittle faults.

Metamorphism

The basement gneisses of the project area have undergone widespread hypersthene granulite facies metamorphism as shown by the co-existence of two pyroxenes in mafic gneisses, the absence of muscovite in sillimanite-quartz-feldspar mineral assemblages and the absence of tremolite in calcareous rocks.

Local variation in metamorphic conditions is common throughout the project area. This is typified by the retrograde metamorphic haloes around granite bodies (i.e. amphibolite - facies assemblages in calcsilicate and mafic gneisses).

Local retrogression also occurs around shear zones,especially on northern Devon Island (Krupicka, 1973). In sulphide-facies iron formation, local retrograde metamorphism is indicated by the alteration of pyroxenes to actinolite and inversion of pyrrhotite to pyrite (such as in the Wyville-Thomson Glacier area).

CURRENT WORK AND RESULTS

Petro-Canada conducted substantial helicopter-supported mineral exploration of the eastern margin of Ellesmere Island in 1982 and 1983. This effort was directed towards geological mapping and interpretation (see Fig. 4-6 and DESCRIPTION) and prospecting using traditional and geochemical, mainly lithochemical, techniques.

Geochemistry:

The 718 rock samples collected in 1982 were used to calculate threshold and anomalous quantities for several elements of interest, using a statistical package developed by Barringer Magenta Ltd. (Table 4-4). An additional 585 rock samples were collected and assayed in 1983. Grab samples were collected in the course of helicopter and ground reconnaissance traversing, as well as detailed rock sampling at 1-metre intervals of the larger sulphide showings. All samples were analyzed for Cu, Pb, Zn, Ag, Ni, Fe, Au and in a few cases, U.

The 1982 work resulted in the designation of 181 mineral occurrences or geochemical anomalies of which the best 20 were recommended for follow-up work in 1983 (Table 4-5). An additional 18 mineral occurrences were discovered in 1983 (Table 4-6).

The 1983 sampling was more selective because the 1982 analytical results indicated that the only geochemical anomalies of interest are found in relatively massive sulphide occurrences. Therefore, there was less incentive to sample all gossans, especially the numerous, poorly disseminated to non-sulphide-bearing "rusty weathering gneisses". Further, with the realization that occurrences of disseminated sulphide are unlikely hosts of economic

TABLE 4-4: THRESHOLD AND ANOMALOUS LIMITS FOR ROCK GEOCHEMICAL DATA - EASTERN ELLESMERE ISLAND

	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Fe %	Au ppb	Ag ppb
Threshold	1800	40	390	925	25	95	2200
Definitely Anomalous	4800	170	5700	1500	30	290	4300

TABLE 4-5: PETRO-CANADA GEOCHEMICAL ANOMALIES 1982

	Name	NTS	Easting	Northing	Elements
1.	Sands Glacier	39F/15	437050	8767280	Cu, Au, Ni, Ag, Co
2.	Cadogan Glacier 4a, 6	39F/8	451000	8690750	Cu, Au, Ag
3.	Tanquary Glacier B	39F/8	470100	8711250	Au, Ag, Zn
4.	Bear Glacier-1	39G/3	546450	8774630	Cu, Ni, Zn, Ag
5.	Leffert Glacier-7 (Rice Strait)	39E/11	504400	8736600	Ni, Fe
6.	Talbot-Trinity 2	39C/14	560850	8658150	Au, Ag, Cu
7.	Trinity Glacier 5	39F/3	553200	8666650	Ni, Cu
8.	Wyville-Thompson 1	39E/5	498600	8695900	Au, Pb
9.	Wyville-Thompson 5	39E/5	481200	8702470	Au, Cu
10.	Penguin-A	39F/3	552100	8669600	Ni, Fe
11.	Talbot Inlet	39F/2	560850	8658150	Pg, Ag
12.	Boger Bay	39C/6	549750	8586000	W, Cu
13.	Thorvald Peninsula	39F/16	475505	8768505	Pb, Au, Zn
14.	Leffert Glacier-4	39E/12	478700	8740400	Ag, Au, Zn
15.	Rutherford-3	39E/13	488000	8755000	Au
16.	Kea-1	39E/13	484500	8754080	Ag, Zn
17.	Cadogan Glacier 7	39F/8	457500	8689050	Cu, Ni, Pb, Zn
18.	Makinson 2	39C/5	529700	8582000	Cu, Ag
19.	Digarmulen 1,2	39E/13	482255	8762250	Pb, Au
20.	Mt. Carey (Eeyore)	39F/16	461200	8759000	Au, Cu, Zn

TABLE 4-6: PETRO-CANADA 1983 MINERAL DISCOVERIES

	Name/Station	Easting	Northing	Map	Zone	Size
1.	Sulphide Showings					
183.	Sterenberg	539400	8544800	39B	17X	medium
184.	Snortin-Nortin	566700	8492700	39B	17X	"
185.	Brae Bay	428000	8401100	48H	17X	large
186.	Gale Glacier	484800	8691000	39E	18X	"
2.	Malachite and related showings					
187.	Easter Island-4	438700	8641400	39C	18X	medium
188.	Belcher Glacier	489800	8395200	48H	17X	"
189.	Thorvald Penin.-2	463200	8770800	39G	18X	"
190.	Cadogan-4b	452100	8689200	39F	18X	"
191.	Easter Island-5	434100	8641500	39C	18X	"
192.	Glentworthia	556100	8523600	39B	17X	"
193.	Penguin-F	551800	8669300	39F	17X	"
194.	Eeyore-2	468300	8757800	39F	18X	large
195.	Leffert Glacier-8	499300	5735000	39G	18X	medium
196.	Sverdrup	540000	8350000	48G	16X	"
197.	Cadogan-4c	448200	8691100	39F	18X	"
198.	Clarence	427600	8522400	39B	18X	"
3.	Arsenide-skarns					
199.	Talbot Inlet 2	445500	8655700	39C	18X	"
4.	Other Occurrences (Barite)					
200.	Cadogan 10	564400	8684600	39F	17X	"

minerals, came the conclusion that, to be potentially economic, a massive sulphide showing must be substantial in size. Small lenses of clearly restricted dimensions were tested only by grab sampling instead of the systematic collection of samples at regular intervals that was applied to a few large showings. Finally, the 1982 results suggested that, where present in geochemically anomalous quantities, economic sulphides are visually distinguishable from barren pyrrhotite or pyrite. As a consequence, visual prospecting is reliable and total dependence need not be placed on geochemical prospecting.

1982:

Petro-Canada's 1982 program in the basement gneisses included all areas as far south as Makinson Inlet. Additional mineral occurrences were sighted in the coastal Thorndike Peaks. In the course of the 1982 field season 181 mineral occurrences were discovered. Of these, about 155 were principally iron sulphide bodies (pyrrhotite with scattered pyrite and traces of chalcopyrite), 22 were malachite, and 4 were thought to be skarn-related sulphide showings. The most significant mineral discovery was the occurrence at Sands Glacier. Rock samples from this occurrence contain up to 13% copper, 0.5% nickel, 0.225% cobalt, 8.23 g/tonne gold, 8.57 g/tonne silver, and 0.34 g/tonne platinum. An additional 18 - 19 mineral occurrences were deemed worthy of follow-up due to their anomalous concentrations of copper, gold, silver and nickel (Table 4-5).

In the course of the 1982 program, Petro-Canada geologists examined all the known sulphide occurrences, including copper-stained rocks on the south coast of Bache Peninsula and along the shores of Buchanan Bay (Christie, 1962a) and gossans that have developed over pyrrhotite - chalcopyrite - sphalerite-rich zones up to 8 m wide in the gneisses (Frisch and others, 1978, p. 138). These gossans were not as impressive as hoped.

1983:

The 1983 program was designed to assess:

1) The Sands Glacier copper-gold occurrence.
2) About 20 lithogeochemical anomalies (copper, gold, nickel, molybdenum) underlain by gneisses.
3) Areas to the south of the 1982 project area that were suspected to be underlain by metasedimentary gneisses similar to those investigated in 1982.

1) 'The Sands Glacier showing was a great disappointment. It was described late in the 1982 season as a stratiform disseminated to massive sulphide gossan at least 200 metres long by 30 to 40 metres thick with at least five semi-continuous sulphide-bearing lenses. Re-investigation showed it to be enclosed in a band of limonite-stained migmatite, 200 metres long. Massive sulphides (chalcopyrite, pyrrhotite, magnetite and pyrite) are restricted to perhaps a dozen pods of several metres each distributed over 30 metres across the east-west strike of the gneisses. The southernmost pods have the highest magnetite content. Pyrite and chalcopyrite (up to 20% locally) is enriched in the central series of sulphide pods, and massive to semi-massive pyrrhotite dominates the northern limits of the occurrence. To the east of the podiform sulphides is a soil gossan (30 m x 10 m) that covers a limonite weathering cap with patches of gypsiferous caliche, malachite and annabergite. Rusty migmatite is terminated abruptly east of the soil gossan by a north-striking linear. The mineralogy, mineralogical variation and structure of the Sands Glacier showing suggest that it may be a metamorphosed sulphide vein rather than an exhalative sulphide horizon.' (DIAND assessment report 081743).

On the basis of follow-up investigations and the 1983 geochemical results, the Sands Glacier showing, although locally enriched in copper, nickel, gold, cobalt and silver, was not found to be large enough to warrant further exploration.

2) The 20 mineral occurrences considered to be worthy of follow-up from the 1982 program were found upon re-investigation to be too small and everywhere too low grade to warrant further exploration.

3) Eighteen new mineral occurrences recognized in 1983 (Table 4-6) include four iron-sulphide showings, twelve malachite and chalcopyrite showings, one arsenide skarn-related showing and one barite occurrence. In addition, rusty psammo-pelitic gneiss horizons and sparsely pyrrhotite-bearing sulphide-facies iron formation can be traced throughout southeast Ellesmere Island, Coburg Island and northern Devon Island.

Although the base and precious metal content of sulphide-facies iron formation have high clarkes of concentration; economic levels are not attained. These rocks have been mapped as discrete metasedimentary lenses rather than mineral

occurrences.

Summary of showings:

183. Sterenberg showing

The Sterenberg showing occurs on a south-facing nunatak 25 km west of Mittie Island. Sulphide-facies iron formation and rusty psammo-pelitic gneiss crops out as a roof pendant within pink granite. The iron formation includes three or four layers of disseminated and podiform pyrrhotite exposed for about 1 km along strike. The pyrrhotite is cut by secondary (retrograde?) pyrite veinlets. Although a few samples contain high background copper values, the occurrence has low economic potential.

184. Snortin-Nortin showing

Graphite and pyrrhotite are concentrated in diabase and pyroxenite dike contacts where the dikes cut rusty psammo-pelitic gneisses and quartzites near Cape Norton Shaw. Although the area of iron staining is impressive (1 km x 200-300 m), pyrrhotite is scarce and the economic potential is non-existent.

185. Brae Bay showing

Concentrations of pyrrhotite and pyrite occur along the contacts of four or five diabase dikes south of Brae Bay. The sulphides range from sparse disseminations to massive concentrations with sulphide abundance increasing toward dike contacts. Host rocks are migmatitic quartzo-feldspathic gneiss (Km). Economic potential is low.

186. Gale Glacier showing

Moraine piles at the snout of the Gale Glacier (10 km west of Cape Isabella) are enriched in boulders of massive pyrrhotite, pyrrhotitic quartzite, and laminated pyrite-biotite-gneiss. Source of the moraine must be nearby, possibly up-ice to the west in the south-facing nunataks of Wyville-Thomson Glacier. Although some samples contain high background zinc, no economic sulphide minerals were identified, and the economic potential is considered to be slight.

187. to 198. Malachite and related showings

Malachite occurrences are described collectively. All these showings are small and display a similarity of occurrence. The malachite is found as patchy stains on fracture planes and weathering surfaces within a variety of anatectic gneisses. Although not confirmed in every case, there appears to be a spatial association of malachite staining and either granite contacts or rocks injected by granite veins or granitic leucosome. Chalcopyrite may or may not be present to explain the surface alteration. Where present, chalcopyrite is found in leucosome segregations with sparse magnetite. Malachite stains of several square metres in area can be derived in some cases from a chalcopyrite occurrence of a few tens of square centimetres in area. The malachite patches are commonly scattered over several hundreds of metres of gneiss in each case. The largest malachite-stained area was found at Eeyore-2. Malachite is semi-continuous for 100-150 metres; however, chalcopyrite is rare.

'Eeyore' (194) contains fluorite and traces of scheelite in calcsilicate gneiss adjacent to a stock of aluminosilicate granite. The remaining 'skarn' occurrences contain either scattered pyrrhotite or malachite in or adjacent to regionally metamorphosed and anatectic calcsilicate rocks.

199. Talbot Inlet-2 showing

This occurrence is in a nunatak 2 km south of the Talbot Inlet showing. Disseminated arsenopyrite occurs near a dolomitic marble contact adjacent to quartzite and porphyroblastic orthopyroxene biotite gneiss. The arsenide mineralization appears to be concentrated with lenses of disseminated pyrrhotite or disseminated graphite and magnetite in the axis of an isoclinal fold in a plagioclase-diopside-calcsilicate rock. High nickel values (690 to 1800 ppm) in two samples suggest the presence of gersdorfite (NiAsS) or some other hard heavy tin-white mineral. Gold (1-2.5 ppm) occurs in the nickel-bearing samples. The arsenide mineralization is stratiform and occurs over a length of 10 metres and a width of 2.5 metres. Due to its small size, the showing has limited economic potential.

Also of interest is a boulder of semi-massive arsenopyrite (with sparse copper: sample 3490) found nearby in a lateral moraine. The boulder is unlike the bedrock mineral occurrence, and is presumably derived from some other undiscovered arsenide showing.

200. Cadogan-10 showing

This mineral showing was found on a nunatak 30 km west of Cadogan Inlet on the north side of Cadogan

Glacier. Coarse to very coarse (up to 30 cm) sparry barite, barito-calcite and calcite occurs in the axial zone of a synform in a sequence of calcitic marbles and psammo-pelitic gneisses. Size and origin of the occurrence is unknown.

New discoveries in 1983 were found to lack both size and grade although two high gold assays were returned from the Talbot Inlet-2 showing, and interesting zinc values were found in the till boulders of the Gale Glacier occurrence.

Recommendation

Further surface exploration was not recommended and the prospecting permits were relinquished at the end of 1983.

VICTORIA ISLAND

Victoria Island is underlain by crystalline Precambrian basement rocks, a concordant sequence of five Proterozoic formations of the Shaler Group, which comprises clastics, carbonates, and gypsum-anhydrite, with a sixth unit, the Natkusiak Formation, comprising basalt flows and volcani-clastics (Thorsteinsson and Tozer, 1962). Closely related to these volcanics are widespread diabase-gabbro sills and dikes (Christie, 1964) that have the same age (650 my. B.P.), chemical and petrological characteristics as the Coronation sills to the south (Baragar, 1977).

The above-mentioned rocks are exposed in a synclinal structure called the Minto Arch (Fortier and others, 1963), that dominates the geology of northwestern Victoria Island, (3 in Fig. 4-1). Precambrian strata of the Minto Arch form a northeast-trending synform, named the Holman Island Syncline (Fig. 4-7), however, the Minto Arch became a positive topographic feature during the Paleozoic. It underlies most of the Diamond Jenness Peninsula, the Saneraun Hills and the Shaler Mountains (Fig. 4-8).

"The angular discordance between the Lower Palaeozoic and the Precambrian rocks of the Minto Arch demonstrates that the Walker Bay anticline and the Holman Island syncline were folded prior to deposition of the earliest Palaeozoic rocks in the area. Later crustal movements, however, are clearly responsible for the present position of the Minto Arch as a structural high, or uplift, with homoclinal sequences of Palaeozoic rocks dipping away from the Arch. There is no evidence in the stratigraphic column of the map-area to suggest that the Minto Arch underwent sudden uplift at any time. The essentially homoclinal sequence of Upper Cambrian(?) to Upper Devonian strata that extends through Prince Albert Peninsula into northeast Banks Island presumably developed as a result of the positive movement that effected the Minto Arch. The uplift is, therefore, presumably Upper Devonian or later. Lower Cretaceous rocks rest unconformably upon the Palaeozoic strata and this suggests that the uplift of the Minto Arch took place prior to the Lower Cretaceous.

The Boothia Arch, east of the map-area, is known to have moved positively, and relatively violently, in late Silurian or early Devonian time. Latest Silurian and early Devonian rocks are not exposed on Victoria Island; consequently there is no record of events for this period. It is conceivable that the Minto Arch moved in late Silurian or early Devonian time (i.e., at the time of movement of the Boothia Arch), but this is improbable." (Thorsteinsson and Tozer, 1964, p. 72).

NORTHWEST VICTORIA ISLAND RECONNAISSANCE PROSPECTING PERMITS 974-997

Panarctic Oils Ltd.	Copper, Silver
P.O. Box 190	77 G/13, 78 B/14
Calgary, Alberta T2P 2H6	87 E/13,G/1,H/3,
	4,7,9,10,16
	88 A/1
	$70^{\circ}52'$-$72^{\circ}08'$N,
	$111^{\circ}30'$-$116^{\circ}30'$W

REFERENCES

Baragar (1976, 1977); Baragar and Loveridge (1982); Christie (1964); Newbury (1969); Palmer and Hayatsu (1975); Thorpe (1972); Thorsteinsson and Tozer (1962).

PROPERTY

Twenty-four prospecting permits (974-997) encompassing 593,648 ha.

LOCATION

The permit areas contain most of the volcanic rocks of the Natkusiak Formation of northwestern Victoria Island. They can be broken into two groups; the first, consisting of nine permits, occupies the central core of Diamond Jennes Peninsula and lies immediately south of the Kuujjua River. The second (15 permits) includes most of the northeast-trending Saneraun Hills and Shaler Mountains (Fig. 4-8). The area is 50 to 275 km northeast of Holman Island or an average of 425 km northwest of Cambridge Bay, which

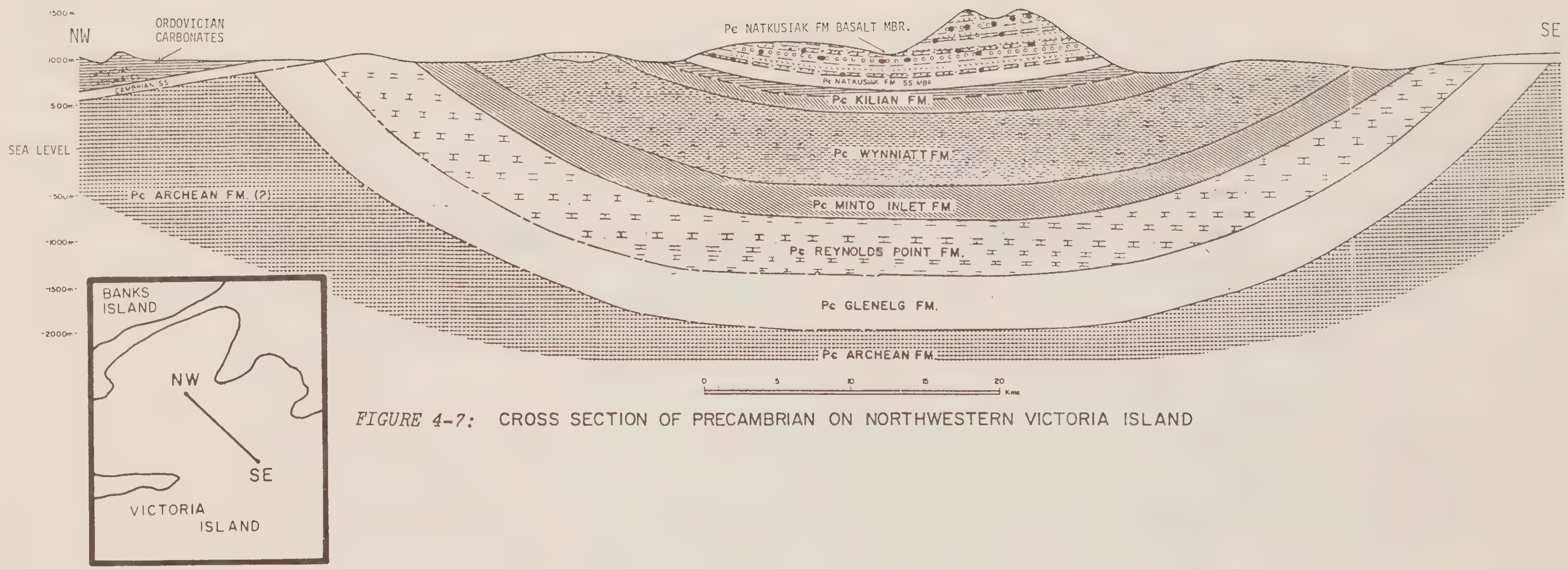

FIGURE 4-7: CROSS SECTION OF PRECAMBRIAN ON NORTHWESTERN VICTORIA ISLAND

LEGEND FOR FIGURES 4-7 and 4-8

QUATERNARY	
18	Areas of thick glacial drift; mainly morainal; outcrops of bedrock are very scarce
CAMBRIAN? ORDOVICIAN AND SILURIAN	
10	10a, Cambrian?, sandstone, minor shale, siltstone, dolomite 10b, Ordovician and Silurian, dolomite, minor chert, shale, sandstone
LATE PRECAMBRIAN	
9	Gabbro dykes and sills; sills not mapped
8	NATKUSIAK FORMATION: basalt flows; minor aggolmerate;

S H A L E R G R O U P (3-7)

7	KILIAN FORMATION: gypsum, anhydrite, shale, sandstone, limestone, siltstone
6	WYNNIATT FORMATION: limestone; minor dolomite, shale, sandstone
5	MINTO INLET FORMATION: gypsum, anhydrite; minor sandstone, limestone, shale, dolomite; siltstone
4	REYNOLDS POINT FORMATION: limestone, sandstone; minor siltstone, shale
3	GLENELG FORMATION: sandstone, limestone, shale, siltstone, dolomite, conglomerate;

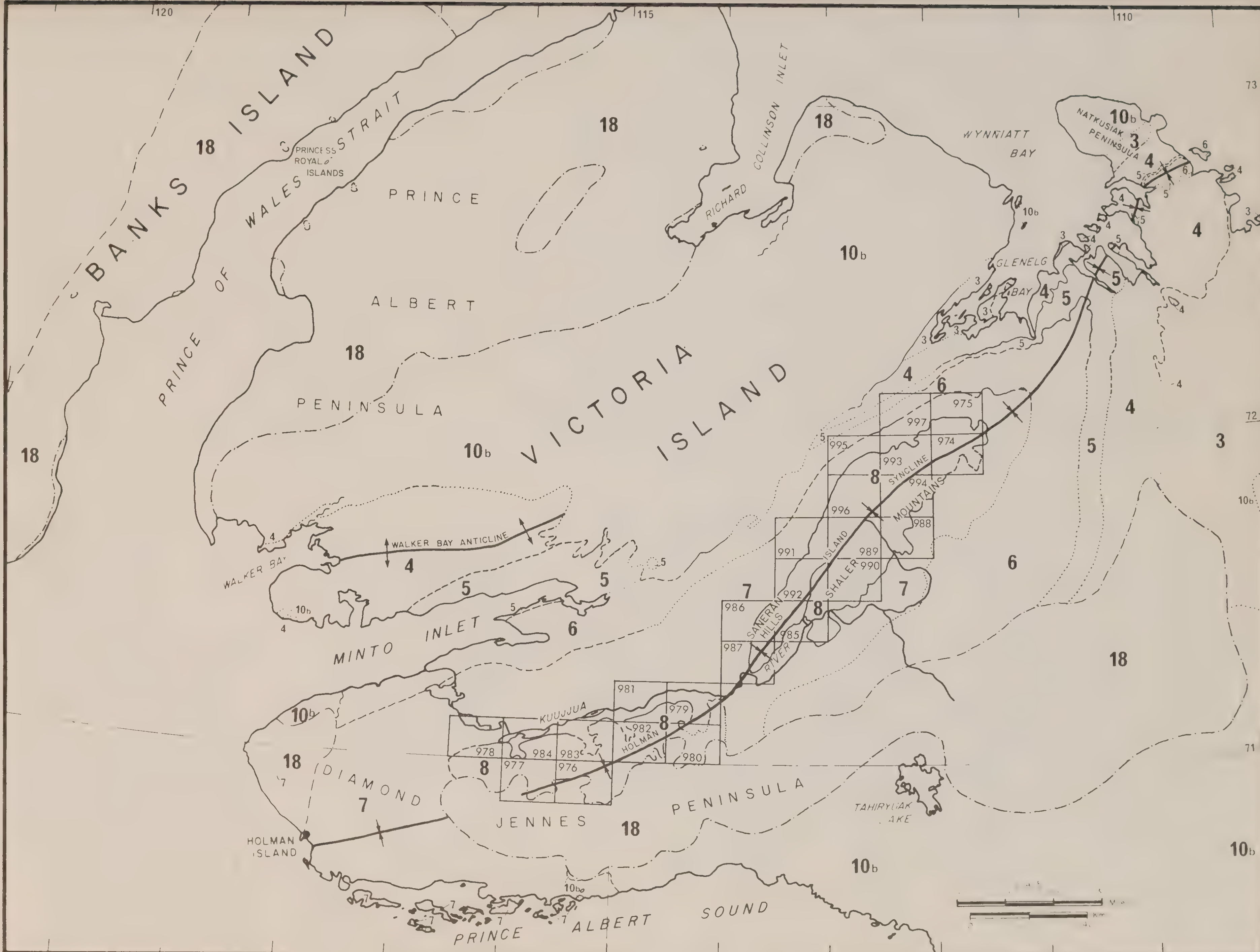

FIGURE 4-8: Map of Precambrian geology and permit areas, Northwestern Victoria Island, modified (from Thorsteinsson and Tozer, 1962)

are the only established communities on Victoria Island. However, the Panarctic Oils Ltd. mineral camp was resupplied by Twin Otter STOL aircraft from their base at Rae Point, Melville Island.

HISTORY

The occurrence of copper on Victoria Island was first reported by V. Steffanson in 1913 on the basis of reports given to him by Inuit in Prince Albert Sound. However, Thorsteinsson and Tozer (1964, p. 77) were the first people of European origin to observe copper ('a few small flecks and flakes') "in situ" in the volcanic rocks of the Natkusiak Formation volcanics.

During the years 1968-70, copper exploration in the Coppermine River area 'spilt over' to Victoria Island as the Muskox Syndicate, Grandroy Mines Ltd. and the M.J. Boylen Engineering Co. Ltd. prospected and explored the Natkusiak Formation for copper. This work resulted in the discovery of numerous copper showings and limited mapping, drilling and geophysics were done in an attempt to delineate the economic potential of some of the best showings. Many of the initial targets were vein-type deposits, associated with a series of north-south faults that transect the Proterozoic section (Thorpe, 1972, p. 141-145).

Panarctic Oils Ltd. acquired Prospecting Permits 974 to 997 on February 1, 1983.

DESCRIPTION

The Natkusiak Formation, as defined by Thorsteinsson and Tozer (1964, p. 37) is a sequence of volcanic rocks that consists of dark-coloured, basaltic flows and pyroclastic sediments. This formation rests disconformably on the Kilian Formation of the Shaler Group and includes the youngest Precambrian layered rocks in the area. The Natkusiak Formation is confined to Victoria Island, where it is exposed in two detached belts along the axis of the Holman Island Syncline.

The formation is named for Natkusiak, late resident of Holman and well-known travelling companion of Arctic explorer Vilhjalmur Stefansson. Natkusiak's grave is in the Holman cemetery. The type section of the Natkusiak Formation is some 25 km south of Glenelg Bay, northern Victoria Island.

The formation attains a maximum thickness of about 300 m at about longitude 112°30'W. Where individual flows have been recognized, they are about 30 m thick. Amygdules commonly characterize the lower and upper parts of flows, whereas the intermediate rock is dense basalt. Red and green agglomerate, commonly poorly indurated and cut by thin veins of calcite, is locally present at the base of the formation. The agglomerate comprises fragments of volcanic rocks, bombs, and baked sedimentary rocks of various types that are embedded in a matrix of calcite and tuff; it varies from zero to 100 m in thickness.

Baragar (1976 and 1977) measured several sections of Natkusiak Formation volcanics for detailed geochemical and paleomagnetic studies. He related them to the Franklin magmatic province (or Franklin Magnetic Interval) of late Hadrynian time (i.e., circa 600 Ma. B.P.). They are the only known surface expression of this event that also includes the Coronation dolerite sills and sheets (Christie, 1964) and the Franklin diabase dikes (Fig. 4-9).

The late Hadrynian age assumed for the magmatic rocks is based upon a K-Ar age determination of 640 Ma for one of the sills reported by Christie (1964) and K-Ar isochron age of 625 Ma determined for the basalts by Palmer and Hayatsu (1975). Confirmation of these ages by Rb-Sr isochron was attempted; the Rb/Sr ratios in the dolerites are uniformly low with limited spread. They cluster about a 2.2 Ga reference isochron (Baragar and Loveridge, 1982). An age of 2.2 Ga is geologically unreasonable. This result is thought to reflect contamination of late crystallizing fractions of the magma by solutions from Archean basement, through which the magma passed. A secondary isochron indicating 384 Ma is also unexplainable, but may be due to contamination or post-Devonian uplift.

"The Natkusiak basalts are typical plateau basalts which have erupted, for the most part, in a subaerial environment. Each flow comprises a massive base, with the exception of a thin amygdaloidal zone at the bottom, and highly amygdaloidal top. The top ranges from 1/4 to 1/10 the thickness of the flow, although some thin flows are almost entirely amygdaloidal. Most flows have a pronounced 'sheeting' structure which is parallel or subparallel to their contacts, and is most closely-spaced at their tops. Weathering of the sheeted basalts is commonly severe. The thinner flows are sheeted throughout and the attendant weathering makes a fresh sample difficult to obtain. In the thicker flows, the lower portion is generally unsheeted and fresh. Almost certainly the sheeting structure is

inherited from a primary feature such as flow layering, but it has been much modified by weathering and produces a very friable rock." (Baragar, 1976, p. 350).

The Natkusiak Formation contains copper-bearing flood-basalts similar to those of the Coppermine River area and the Keeweenawan Peninsula of Upper Michigan. Reconnaissance prospecting of Prospecting Permits 68-81 (originally granted to Ashmore Gold Mines Ltd.), NTS 87H/7,9 and 16, in 1968 resulted in the discovery of more than 100 showings of chalcocite, bornite, malachite, azurite, chalcopyrite and native copper (Thorpe, 1972, p. 142).

"Some native copper and chalcocite occur in amygdaloidal flow tops, in flow-top breccias, and as disseminations and fracture fillings in massive basalt. However, mineralized zones related to fault zones, generally mineralized fault breccias, were considered to be the most important type of showing.

Showing W5 is the most important zone of mineralization that was discovered. The mineralization occurs along a fault which strikes northwest and extends at least 40 miles (65 km) across the Precambrian rocks, and possibly a further 30 miles (50 km) across the Paleozoics to the northwest. The showing is located at approximately 71°52'N and 112°43'W. Chalcocite, bornite, chalcopyrite and pyrite occur in fault breccia, as veins, and as disseminated replacement masses along the fault zone. Some narrow veins of massive sulphides occur in the country rock on either side of the fault, and some of the copper mineralization occurs in quartz-prehnite veins. The mineralized zone is evident mainly from fragments in talus which are distributed along a length of 1,000 ft. Blocks of nearly massive chalcocite up to 1 ft. across are present along the zone. High-grade samples assayed 10-30% copper and 15-85 g/t or ppm silver"(Thorpe, 1972).

A number of other showings were found that are considered to be of the fault breccia-replacement type and of possible significance. These showings contain semi-massive or massive chalcocite, but all except three consist only of talus fragments.

Newbury (1969) studied the copper showings of claims on the southwestern block of Natkusiak Formation (Diamond Jenness Peninsula). He described epigenetic native copper in permeable zones, prehnite-bearing vugs, amygdules and fractures. Chalcocite apparently formed at a water table from vadose copper bearing fluids.

FIGURE 4-9: Proterozoic continental basaltic flood lavas and dike swarms, northern Canadian Shield, (from Baragar, 1977)

CURRENT WORK AND RESULTS

1982:

Several traverses were made to study the lower Paleozoic rocks, mainly carbonates, of southern and central Prince Albert Peninsula, as well as the larger of the Princess Royal Islands. The main purpose of this work was to obtain samples of the petroliferous Blue Fiord Formation of Devonian age. Black, tarry material with a strong petroliferous odour was found in Blue Fiord Formation of Princess Royal Islands. These oil seeps have been known for some time.

The main purpose of exploration was to discover and assess copper and silver showings in the basalt member of the Natkusiak Formation and sulphides in the Proterozoic sediments, particularly the calcareous mudstones and carbonates of the Kilian Formation. Most of this work was done in the Saneraun Hills-Shaler Mountains or northeastern block of Natkusiak Formation.

Geochemistry and Geophysics

Stream water and stream sediment samples were collected from known Cu showings, as well as from areas where none are known. The water samples were analyzed for U, Cu, Ni, Fe and Mn; while the stream sediments were analyzed for U, Au, Ag, Cu, Ni, Fe and Cr. Stream waters produced very little indication of anomalous results, while stream sediments were not consistent and impossible to obtain at a fair number of sites. They did show a good correlation between Cu and Ag, and Ni and Cr.

A 3 x 2 km grid was established near the northern end of the Saneraun Hills and a couple of hundred soil samples and radiometric readings were taken. Copper assaying up to 1760 ppm and gold up to 90 ppm were the only elements to yield high anomalies. The radiometric survey did not produce interesting results.

Mapping and Prospecting

Panarctic Oils Ltd. geologists examined four areas of copper showings; two in the northeastern block (at 71°48'N, 112°40'W and 71°30'N, 113°15'W) which had been at least partly examined by the Muskox Syndicate and Grandroy Mines Ltd.; a small basaltic outlier to the southeast of the northern block (71°28'N, 113°10'W); and in the west end of the southwestern block (71°10'N, 71°-40'W). Four main types of copper-silver showings were recognized in these areas; a) vein type - mainly massive chalcocite with minor native copper, b) filling vesicules and voids in vesicular and pyroclastic basalts, c) fracture fillings - similar but narrower than veins, and d) disseminated copper minerals in massive or pyroclastic basalts. The fracture fillings are commonly malachite and/or azurite smears along fracture planes. They occasionally are rich in silver and several spectacular pieces of native copper have been obtained from them.

About half of the showings are in outcrop; the rest are in talus or frost heaves. Native copper is the most common protore and malachite is the dominant secondary mineral. Lesser amounts of cuprite, chalcocite, chalcopyrite, bornite and azurite are found. Minor amounts of native silver are associated with native copper. Pyrite is rare, but specular and earthy hematite are both common.

Native copper was found in all types of vesicular basalt, however, the highest grades were in a medium to dark green variety. Vesicles in this rock-type are normally filled with native copper, calcite, silica and prehnite; minor amounts of chrysacolla, malachite, chlorite, zeolites and serpentine are also present.

No evidence of economic mineralization was found in the Proterozoic sediments of the Shaler Group, however, potential for sedimentary copper mineralization similar to the White Pine Mine of Keewanawan of northern Michigan exists in the Upper member of the Kilian Formation immediately beneath the Natkusiak Formation.

1983:

During the 1983 field season the first three weeks were devoted to a stream sediment reconnaissance program. A total of 421 samples were taken in duplicate. One sample was a coarse fraction of the sediment, the other the finer fraction. The coarser fraction was examined by microscope in Calgary for any rock fragments containing copper-bearing minerals. The finer fractions were sent to a commercial lab for copper and silver analysis. The resulting analyses were plotted and contoured on a 1:250,000 scale map and a total of 16 copper and/or silver anomalies were discovered; some of them covering areas of previously known mineralization, others not.

Later in the summer, after the geochemistry was complete and the results were analysed and

compiled, several of the anomalous areas were examined on the ground. The source of the mineralization was traced in several cases to various sources in the basalts such as vein chalcocite, disseminated native copper in the vesicular flow tops of the basalts, native copper in veins and veinlets or disseminated mineralization in massive flows (possibly primary mineralization).

Several days were spent on the old W-5 showing of Muskox Mines Syndicate in an effort to determine the extent of the mineralization, which occurs as vein sulphides and as native copper in vesicular flows or flow tops.

CENTRAL ARCTIC: CORNWALLIS LEAD-ZINC DISTRICT

The Cornwallis Lead-Zinc District is in and was controlled by tectonic elements of the Cornwallis Fold Belt, a steep-sided anticlinorium of Proterozoic to Devonian formations (Table 4-7) that overlie a basement horst (Kerr, 1977a and 1977b). The deformation in the Cornwallis Fold Belt can be attributed to several pulses of differential vertical uplift of the underlying Boothia Horst. It was formed mainly by the Cornwallis Disturbance, which consisted of four main pulses or cycles that began with uplift and erosion of the fold belt and was followed by broader regional subsidence and resumption of deposition (Kerr, 1977a). The Cornwallis Disturbance lasted from Early Silurian to Late Devonian. Each uplift or tectonic pulse is marked by a regional unconformity of varying local significance (Table 4-7).

The Cornwallis Fold Belt is centered at Resolute Bay in the Central Arctic of Canada. The northern half coincides with the Cornwallis Lead-Zinc District of Kerr (1977b) and includes all of Cornwallis Island and Little Cornwallis Island, the eastern margin of Bathurst Island and the west and central two-thirds of the Grinnell Peninsula of northwestern Devon Island (Fig.2-28). In addition to establishing the geological framework of the region, Kerr (1977a, 1977b) outlined four probable controls on mineralization (Table 4-8) that are remarkably consistent with regard to lead-zinc deposits and prospects in the region, including the large, high-grade Polaris deposit. The region has been mapped geologically by Thorsteinsson and Kerr (1968).

The Cornwallis Lead-Zinc District of the Central Arctic was the scene of renewed mineral exploration in 1980-81 by Cominco Ltd. who obtained and explored

TABLE 4-7: STRATIGRAPHY AND TECTONIC EVENTS OF THE CORNWALLIS LEAD-ZINC DISTRICT (from Kerr, 1977b)

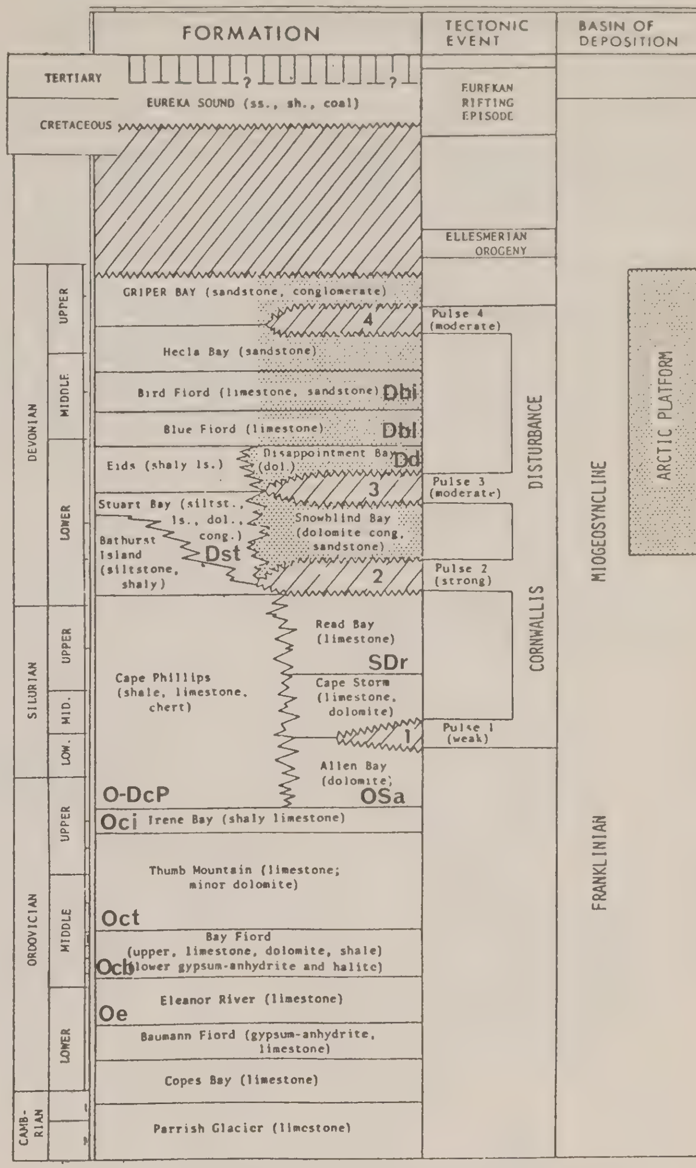

TABLE 4-8: CONTROLS ON MINERALIZATION IN THE CORNWALLIS LEAD-ZINC DISTRICT (from Kerr, 1977b)

(1) the host is the upper bioclastic part of the Ordovician Thumb Mountain Fm. (12 of 14, the other 2 are also in carbonate).

(2) the host rock is locally brecciated dolomite (14 of 14, sparry dolomite veining known as pseudobreccia is common).

(3) the showings lie within the bounds of the Cape Phillips shale basin and structurally higher than the shale (10 of 14, the Cape Phillip shales may be a source of the metals).

(4) the host is overlain unconformably by the Disappointment Bay Fm., (Pulse 3 in Table 4), (7 of 8, one is in the Disappointment Bay and 6 are unknown).

10 new prospecting permits (Gibbins, 1984). However, 1982 work was reduced to remapping parts of two permits and 1983 work to claim-staking on Kalivik Island, a small island in Crozier Strait, 17 -19 km north-northwest of the Polaris Mine.

As noted earlier and in Chapter 2, Cominco Ltd.'s Polaris Mine began commercial production in March, 1982 succeeding the Nanisivik Mine as the world's most northerly metal mine.

PROSPECTING PERMITS 703-704

Cominco Ltd.	Lead, Zinc
1700-120 Adelaide St. W.	58 G/11,6
Toronto, Ont., M5H 1T1	75°22'N, 94°45'W

REFERENCES

Gibbins (1984); Gibbins and others (1977); Kerr (1977a, 1977b); Padgham and others (1976; Thorsteinsson (1973); Thorsteinsson and Kerr (1968).

DIAND assessment report 081707.

PROPERTY

Prospecting Permit 703	58 G/6 NW
(Musk Ox - Caribou Anticline)	
Prospecting Permit 704	58 G/11 SW
(Stuart River)	

(Note: Permit 704 also includes the WALRUS claims)

LOCATION

The permits are between the Stuart and Gill Rivers of northernmost Cornwallis Island. The area is 100 to 130 km due north of Resolute Bay (4 in Fig. 4-1 and Fig. 4-10).

HISTORY

Cominco Ltd. held Prospecting Permit 53 (NTS area 58 G / 6) from 1966 to 1967 and Canadian Superior Exploration Ltd. held Prospecting Permit 292 (NTS area 58G/6) from 1973 to 1975 (Gibbins and others, 1977).

Prospecting Permits 701, 703 and 704, along with 8 adjacent permits, were acquired in 1980. Geological

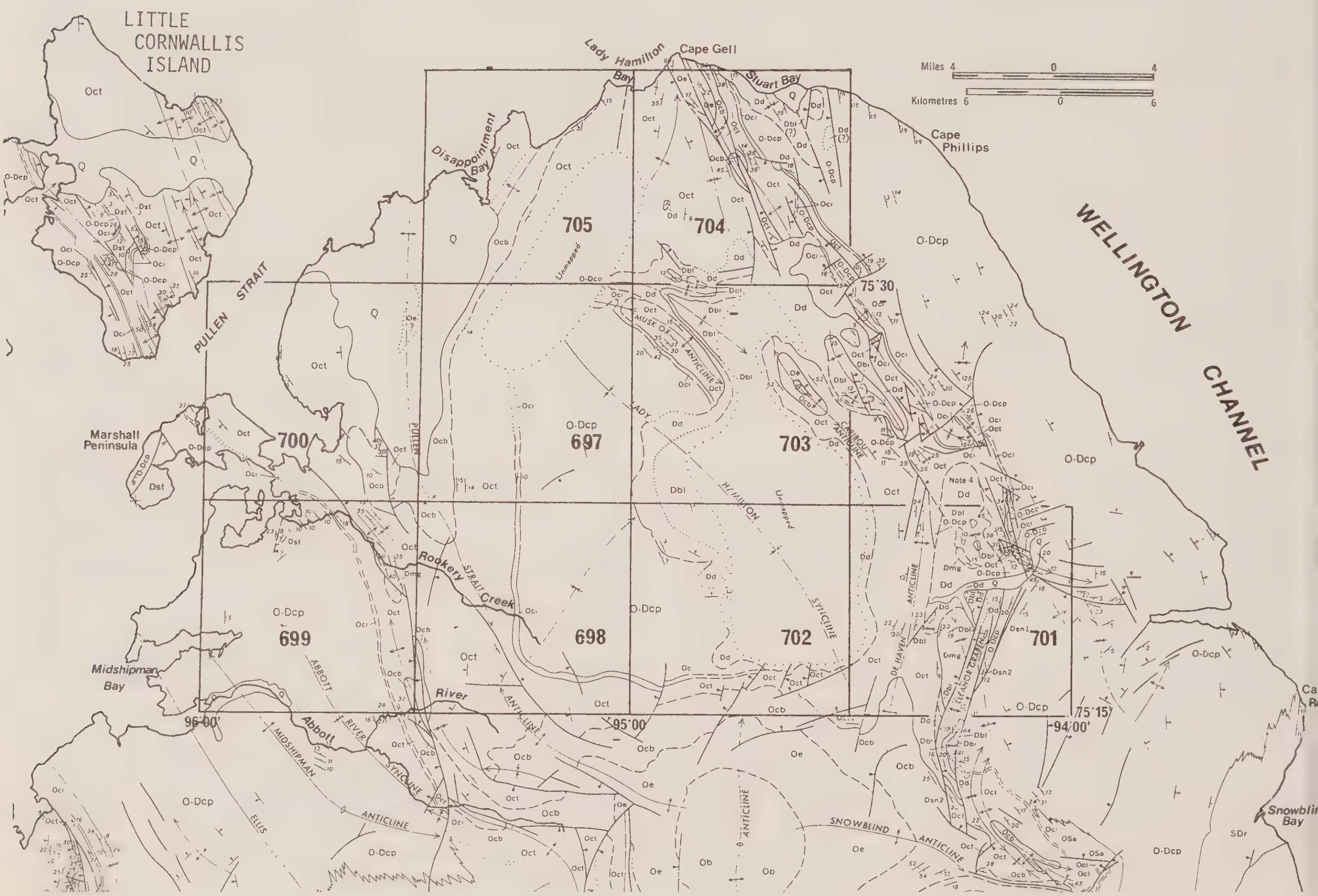

FIGURE 4-10: Geology of prospecting permits northern Cornwallis Island (from Thorsteinsson and Kerr, 1968). See Table 4-7 for explanation of unit abbreviations.

mapping and geochemical sampling was done on Prospecting Permits 703 and 704 in 1980-81. This work resulted in the discovery of 14 showings and re-interpretation of much of the Thumb Mountain Formation as Bay Fiord, Disappointment Bay and Blue Fiord Formations (Gibbins, 1984, p.106).

The WALRUS 1-40 claims, near the center of permit area 704, were staked by Cominco Ltd. in 1965 to cover geochemical anomalies and small surface showings. These claims were explored in 1966 by soil sampling, IP surveying and geological mapping. Seven holes (115 m) tested a 370 m IP anomaly (Padgham and others, 1976, p.42). The results of this drilling were described as inconclusive.

In 1970, 12 km of gravity survey and additional geological mapping were completed. The WALRUS claims were taken to lease in 1974 (Gibbins and others, 1977).

DESCRIPTION

Geological maps of the area (Thorsteinsson, 1973; Thorsteinsson and Kerr, 1968) show that much of the permit areas are underlain by Thumb Mountain Formation, host rock of the Polaris and Eclipse deposits and many other lead-zinc showings of the Cornwallis Lead-Zinc District (Kerr, 1977b). The remaining main controls of mineralization in the district, namely

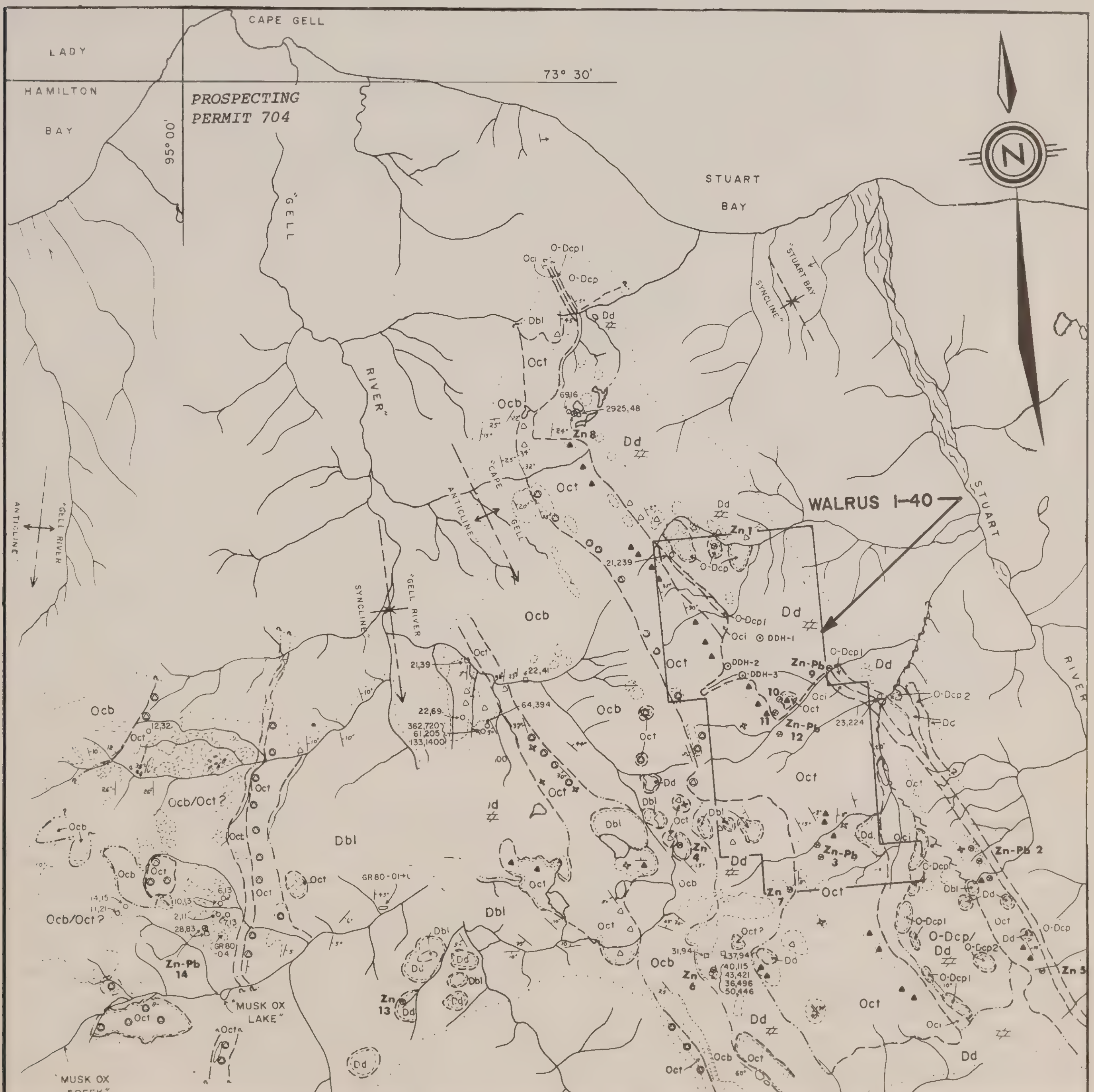

FIGURE 4-11: Geology of Permit 704 and WALRUS claims (from Cominco assessment reports)

dolomite breccia, the Cape Phillips Formation shale facies and the relationship with the sub-Disappointment Bay Formation unconformity (Kerr, 1977a, 1977b), are also present and indicate a favourable exploration environment.

Prospecting Permit 703 contains the Lady Hamilton Syncline in the southwest and the Musk Ox and Caribou fold structures in the northeast (Fig. 4-10). All fold structures are northwest-trending. The central and southern portions are poorly drained, unmapped areas with numerous lakes and few outcrops. This region is presumably underlain by recessive Devonian strata. Faulting is intense only within the Caribou Fold structure. The youngest and oldest strata exposed are the Devonian Bird Fiord Formation (within the Musk Ox and Caribou synclines) and the early to middle Ordovician Eleanor River Formation (within the Caribou Anticline). Showings in the southwest part of the Caribou Anticline, are low grade; up to 3% hydrozincite and smithsonite.

Prospecting Permit 704 is underlain by the Eleanor River, Thumb Mountain, Irene Bay and Cape Phillips Formations. These strata are deformed by a series of north-northwest folds and cut by numerous, similarly trending faults (Figs. 4-10 and 4-11). Both regional and local faults are represented. The oldest and youngest strata exposed are the Eleanor River and Blue Fiord Formations respectively. The Devonian Disappointment Bay Formation unconformably overlies strata in much of the area. This unconformity (Pulse 3 in Table 4-7) is the major unconformity in the Cornwallis Fold Belt and is present near most of the important zinc-lead showings and deposits (Kerr, 1977a, 1977b). Pre-unconformity weathering, solution collapse (sinkholes) and possibly faulting have produced significant relief at the base of the Disappointment Bay Formation.

CURRENT WORK AND RESULTS

In Prospecting Permit 704, modifications were made in the geological map near the old Stuart River camp in the northeast corner of the permit area. The most important new work involved the recognition and mapping of strike-faults that produce repetitive blocks of east-dipping, north-northwest - trending Cliff member of the basal Cape Phillips Formation. As the Devonian Disappointment Bay Formation conglomerates are apparently not affected by these faults, they may have acted as channelways for pre-Disappointment Bay karst processes.

In the Gell River area, west of the old camp, rusty gypsum-calcite-limonite gossans were examined, but zinc-zap and chemical analysis of samples failed to indicate significant metal content.

Work on Permit 704 confirmed that many rocks mapped originally as Thumb Mountain Formation are in fact Bay Fiord Formation. Minor fracture-hosted lead-zinc showings, observed in the vicinity of the Caribou Anticline in 1981 and assigned to the DB chert member of the Thumb Mountain Formation, are now considered to be in the lower-most chert member of the basal Thumb Mountain Formation. These showings are very small and have very little economic potential.

BORDEN BASIN-BORDEN PENINSULA, BAFFIN ISLAND

Borden Peninsula is part of northern Baffin Island and is 500 km north of the Arctic Circle. The area of interest, containing the Society Cliffs Formation, is bounded by the Strathcona Sound and Adams Sound grabens and extends from Admiralty Inlet on the west to Milne Inlet in the east-southeast (Fig. 4-12).

Most of Borden Peninsula is underlain by Neohelikian shales, quartz arenites, greywackes, arkoses, conglomerates and carbonates (Table 4-9). The carbonates commonly contain stromatolites or bioherms or both. About 90-150 m of tholeiitic plateau basalts occur near the base of the sequence. Faulting occurred during deposition that took place in a southeasterly trending rift zone.

A complex assemblage of Aphebian-Archean gneisses is separated from the overlying Neohelikian strata by a nonconformity. A thin regolith is present in a few places on the gneisses, which are commonly stained red for several metres below the nonconformity (Jackson and others, 1978, p. 3).

Mississippi Valley-type zinc-lead deposits occur in the Society Cliffs Formation at Nanisivik, Hawker Creek and elsewhere on Borden Peninsula. The Society Cliffs Formation is characterized by thick to massive beds of regularly laminated, brownish-grey to grey stromatolitic dololutite and dolosiltite. Planar stromatolites are ubiquitous; low domal varieties are common and cabbage-head types are less common (Jackson and others, 1978). Society Cliffs strata are shallow, subtidal to intertidal in origin and a strong, fetid, petroliferous odour is normally given

off by freshly broken rock. Dolomite breccia is common and some of this brecciation can be related to early karsting (Olson, 1984; Geldsetzer, 1974 a & b).

Hadrynian diabase intrudes all older rocks in the area and remnants of flat-lying Paleozoic sandstones and dolomite extend onto Borden Peninsula from adjacent parts of Baffin Island.

Papers by Jackson and Iannelli (1981) and Jackson, Iannelli and Tilley (1980) give a recent geological synthesis of the region.

Exploration 1982 - 83:

In 1982 and 1983 mineral exploration of Borden Basin was for Mississippi Valley-type lead-zinc deposits in the Society Cliffs Formation dolomite (Nanisivik Mines Ltd.) and for shale-hosted lead-zinc deposits in the Arctic Bay and Victor Bay Formations (Petro-Canada). Work was more or less restricted to the Nanisivik Mine property (Chapter 2) and the southeasterly trending belt of Uluksan Group and upper Eqalulik Group sediments that bisect Borden Peninsula and Borden Basin; this area extends from Strathcona Sound (Admiralty Inlet) in the northwest to Milne Inlet in the southeast (Fig. 4-12). It corresponds to the central North Baffin Rift Zone of Jackson and Ianelli, 1981.

In 1981, Nanisivik Mines Ltd. began regional exploration of the area using a multi-instrument airborne-geophysical survey to cover the Society Cliffs Formation. They obtained 14 Prospecting Permits in February,1982 to protect areas of interest (Gibbins, 1984, p.87-90). A Petro-Canada subsidiary, 103912 Canada Inc., obtained 12 Prospecting Permits (957-968) in 1983 (Fig. 4-13).

Nanisivik Mines Ltd. had large programs with estimated exploration expenditures of 1.8 million dollars in 1982 and 0.9 million dollars in 1983. However, Petro-Canada's effort was restricted to about one month of work near the end of the 1983 field season.

No work was done on Nanisivik Mines Ltd.'s Milne Inlet Prospecting Permits (891-893 and 897-899). These permits were relinquished in 1983. The results of previous mineral exploration in the Borden Peninsula area are summarized by Gibbins (1984).

Nanisivik Mines Ltd.'s 1982-83 exploration efforts were rewarded by the discovery of 348,000 tonnes of probable ore, grading 13.7% zinc and 2.4% lead. This new zone is in the southeastern part of the mining lease and is called 'area 14' (See chapter 2).

PROSPECTING PERMITS 890, 894 and 895

Nanisivik Mines Ltd.	Zinc, Lead
401, 44 Victoria St.	48 A/6,10
Toronto, Ont., M5C 1Y2	72°30'N,82°15'W

REFERENCES

Blackadar and others (1968a); Gibbins (1984); Jackson and others (1978, 1980); Jackson and Iannelli (1981); Laporte (1974a).

DIAND assessment report 081723.

PROPERTY

Prospecting Permit 890	48 A/10 SW
Prospecting Permit 894	48 A/6 NE
Prospecting Permit 895	48 A/6 NW
Includes:	
BERT claim	48 A/6
ROB 1 claim	48 A/6,11

LOCATION

The permits are near the southeast corner of Borden Peninsula, just north of the Magda icefield. The permit areas are 80 to 110 km southeast of Nanisivik and 30 to 60 km west of Tremblay Sound (Fig. 4-13).

HISTORY

In 1981, Nanisivik Mines Ltd. contracted Aerodat Ltd. to fly 5,352 line km of helicopter-borne magnetic, electromagnetic and VLF-EM survey and Paterson, Grant and Watson Ltd. to compile and interpret this data. Some 150 EM and VLF-EM conductors were identified as probably of bedrock origin and 74 of these were recommended for further investigation (Gibbins, 1984).

Nanisivik Mines took out Prospecting Permits 890, 894 and 895 in February,1982. The ROB 1 claim was staked in April,1981 and the BERT 1 in October, 1981 (Gibbins, 1984). Early (1969-1970) exploration in the area is discussed in Laporte (1974a, p.144-151).

DESCRIPTION

The permits are in the central part of the Central Borden Rift Zone (Jackson and others, 1978, 1980 and Jackson and Iannelli, 1981). The rift zone contains most of the Helikian Society Cliffs Formation outcroppings in the region.

CURRENT WORK AND RESULTS

Anomalies identified by the 1981 airborne geophysical surveys were identified, gridded, mapped, and tested with ground VLF and magnetometer surveys. Soil samples were collected and analyzed for lead,

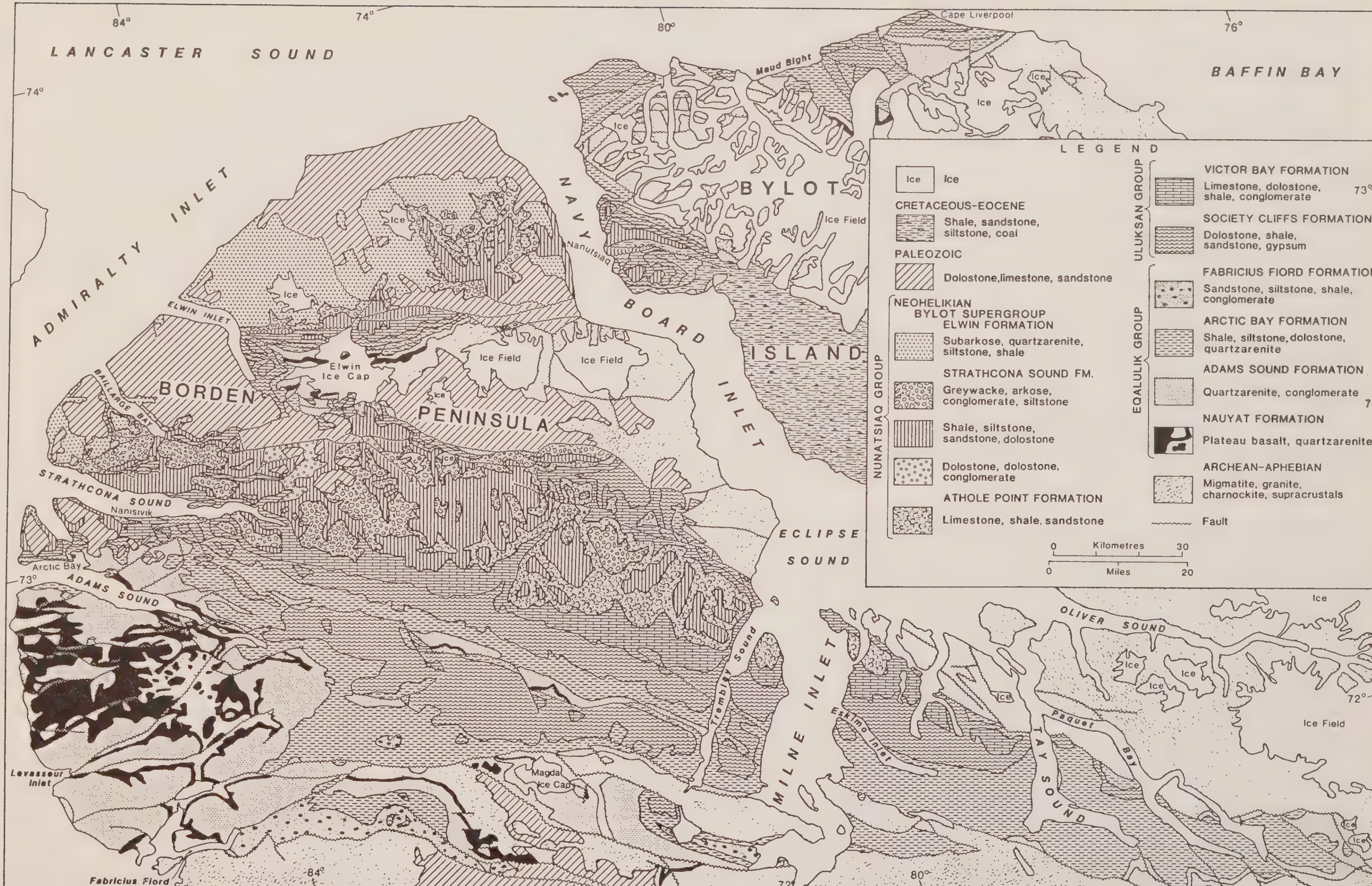

FIGURE 4-12: Geology of the Borden Basin (from Jackson and Iannelli, 1981)

zinc and copper. Where warranted, a Max-Min II HLEM survey was used to define conductors in more detail. A pilot reconnaissance geochemical stream-sediment survey was undertaken in the area of the BERT claim.

Prospecting Permit 895:

Anomaly 3-B3-21 represents a weak airborne VLF-EM anomaly 3 km east of the BERT claim. About 2 percent of the gridded area is outcrop of flat-lying dolomite of the Society Cliffs Formation. The rest of the area is soil, talus and boulders. Disseminated galena was found just west of the grid in an area underlain by altered dolomite. Ground VLF, HLEM and magnetometer surveys did not yield strong responses. One northwesterly trending gabbro dike was interpreted from the magnetic data.

Anomaly 3-B3-17 is 1.5 km north of the BERT claim. The grid is underlain by shale of the Arctic Bay Formation and includes two north-northwesterly trending gabbro dikes. The magnetic data and one small anomaly in the Fraser filter data correspond to this gabbro dike. The soil geochemical data show several high copper anomalies, but these were collected near the gabbro dike and probably related to it.

Stream-sediment sampling in 1983 revealed two main anomalies: north of the BERT claim and north of Magda Lake, although the latter is high in copper as well as zinc and may indicate a dike provenance.

Prospecting Permit 894:

Permit 894 is directly east of Permit 895. Magda Lake is in its southwest corner. Society Cliffs Formation dolostone and underlying Arctic Bay Formation shale are exposed over the northern two-thirds of the area. Aphebian basement gneiss and Adams Sound Formation quartzite occur south of the Magda Lake drainage, which marks a major regional westerly striking fault. Disseminated sulphides are associated with the dolostone-shale contact, but no economic concentrations are known.

No ground follow-up has been done on any airborne anomalies in the permit area.

About one third of the regional stream sediment sample survey was conducted on Permit 894.

Prospecting Permit 890:

Society Cliffs Formation dolostone crosses the area in a belt of outcrop that extends through the northwest and southeast corners. It is underlain to the southwest by Arctic Bay Formation shale and overlain to the northeast by Victor Bay Formation shale. No mineralization is known.

No ground follow-up has been done as the permit is north of the area covered by the aerial geophysical survey.

BERT CLAIM

Nanisivik Mines Ltd.	Lead, Zinc
401, 44 Victoria St.	48 A/6
Toronto, Ont., M5C 1Y2	72°28'N,82°45'W

REFERENCES

Gibbins (1984); Jackson and Iannelli (1981); Laporte (1974a); Padgham and others (1978). DIAND assessment report 081710.

PROPERTY

BERT claim

LOCATION

The BERT claim is located about 83 km southeast of Nanisivik (Fig. 4-13). A small airstrip at Magda Lake is 15 km to the southeast. However, it becomes muddy early in the summer.

HISTORY

The BERT claim was recorded October 1, 1981, to protect mineral rights in an area over which was recorded a strong EM anomaly discovered during the 1981 reconnaissance airborne geophysical survey (Gibbins, 1984). Galena and lesser amounts of sphalerite were observed in float and overburden found on the claim.

Geologists working for King Resources Ltd. explored the Magda Lake region between 1970 and 1973 (Laporte, 1974a; Padgham and others, 1978), but apparently did not find the showing or EM conductor.

DESCRIPTION

The BERT claim is in the Borden Basin, an aulacogen-like structure which evolved within the North Borden Rift Zone (Jackson and Iannelli, 1981).

The majority of the claim area is underlain by fine-grained black fissile shales of the Arctic Bay Formation. These are locally overlain by dolostones of the Society Cliffs Formation. These formations are cut by two phases of fault-controlled dike swarms; an older E-W Borden dike swarm and a younger NW-SE Franklin dike swarm (Jackson and Iannelli, 1981).

CURRENT WORK AND RESULTS

1982

Geological mapping and prospecting revealed

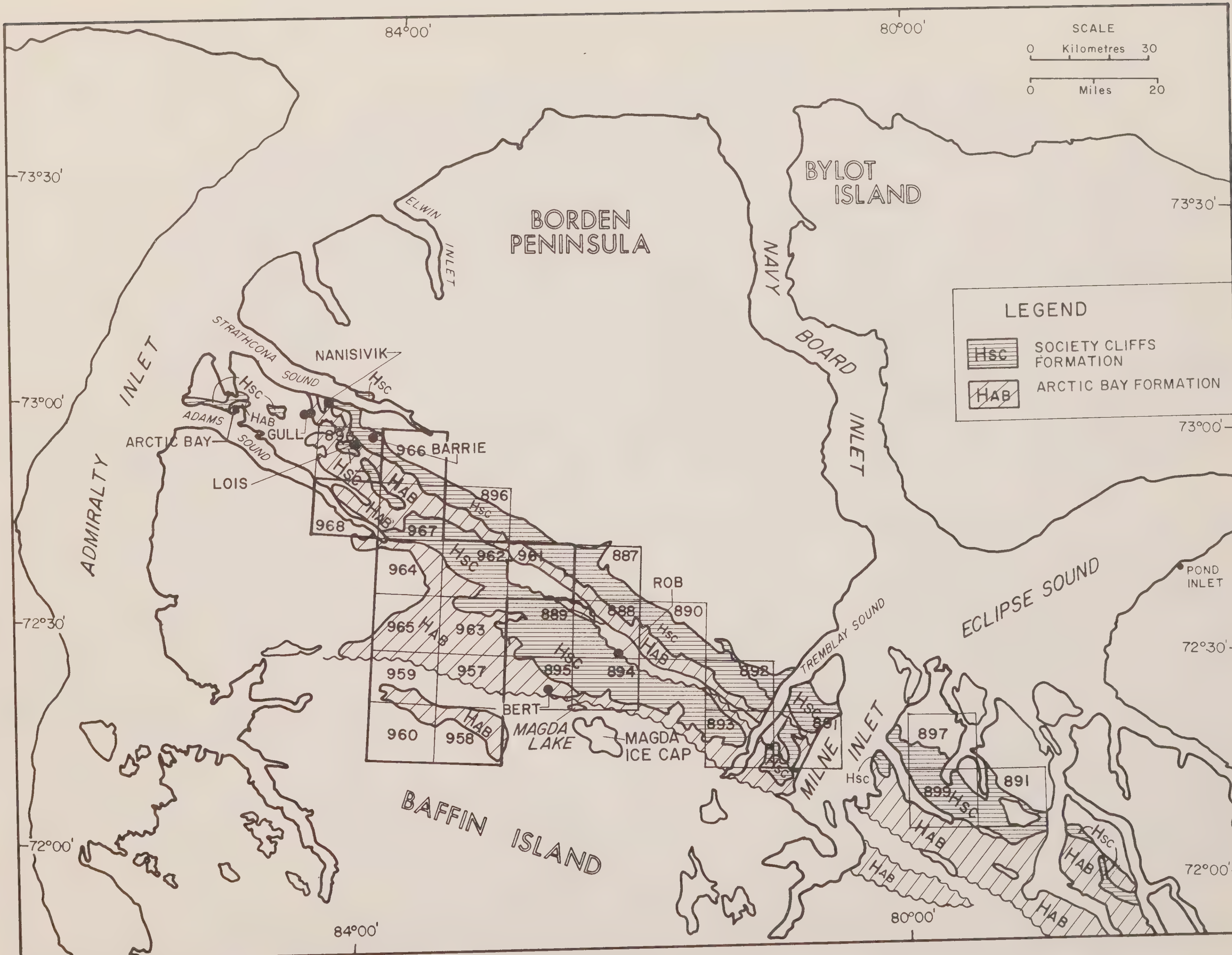

FIGURE 4-13: Claims and permit areas Borden Peninsula, northern Baffin Island

sulphide minerals in several distinct areas. The commonest showings are dike-or contact-controlled. Massive galena and sphalerite are found in gossanous 'sandy' dolostone float of the basal part of the Society Cliffs Formation; assays in excess of 65% combined lead and zinc were obtained. Minor fracture fillings of yellowish sphalerite, galena, and smithsonite in the interbedded sandy and massive unit have been noted with assays up to 3.5% combined lead-zinc. Near the main dike on the north grid, minor pyrite with sphalerite in 'cooked' dolostone float assaying up to 36% Zn has been noted. Hematite after pyrite has been observed throughout the Society Cliffs Formation sequence in varying amounts. Magnetite veins to cm scale occur in one locality in a 'bleached' dolostone on the contact with the northernmost gabbro dike.

A regional geochemical soil sampling survey at 25 m intervals outlined four zones of anomalous lead and zinc. The first appears to represent downslope transport or mineralized 'sandy' float from the Arctic Bay/Society Cliffs contact. The second zone appears to be related to more massive strata with Pb-Zn fracture fillings higher in the Society Cliffs Formation sequence. The third zone may also represent migration of mineralized float from the Arctic Bay/Society Cliffs contact, while the fourth zone appears to be dike related.

Magnetometer and VLF-EM surveys of the total grid area outlined gabbro dikes. The VLF Fraser filter contours outlined narrow zones believed to represent the Arctic Bay Formation/Society Cliffs Formation contact near the center of the claim.

Neither the VLF nor the Max-Min EM surveys explain the amount of mineralized float observed. An IP survey showed broad, medium-strength anomalies.

<u>1983</u>

Additional geological mapping and IP work was completed in 1983. The results of the exploration done to date suggest that the Pb-Zn minerals are localized near the Society Cliffs/Arctic Bay contact with some possible migration into fracture fillings in overlying more massive dolostone units.

PROSPECTING PERMITS 886-889

Nanisivik Mines Ltd.	Zinc, Lead
401, 44 Victoria St.	48 A/11,13
Toronto, Ont., M5C 1Y2	$72^o30'$-$72^o53'$N
	82^o-$83^o30'$W

REFERENCES

Gibbins (1983a, 1984); Jackson and others (1978, 1980); Jackson and Iannelli (1981); Laporte (1974a); Olson (1977).

DIAND assessment report 081722.

PROPERTY

Prospecting Permit 886	48 A/13 SE
Prospecting Permit 887	48 A/11 NE
Prospecting Permit 888	48 A/11 SE
Prospecting Permit 889	48 A/11 SW
ROB claim	48 A/11 SE

LOCATION

Prospecting Permit 886 is centered 48 km east-southeast of the Nanisivik mine. The Adams River runs northwesterly through the permit area from its southeast corner. A small airstrip lies near the center of the permit area on the northeast side of the Adams River.

The Hawker Creek pyrite-sphalerite-galena showings (Gibbins, 1983a, p.28-30) are centered near the northwest corner of Permit 886.

Prospecting Permit 887 is centered 83 km east-southeast of Nanisivik at the headwaters of the Alpha River. Permit 888 adjoins the southern boundary of Prospecting Permit 887, 17 km north of Magda Lake, and includes most of the ROB claim (Gibbins, 1984, p.89). Prospecting Permit 889 adjoins the west boundary of Prospecting Permit 888 (Figure 4-13).

HISTORY

The area has been explored for Nanisivik-type ore deposits since 1963 (Laporte, 1974a). Most of this work was done for King Resources Ltd. and its successor Global Arctic Islands Ltd. by Trigg Woollett Consulting Ltd.. Olson (1977) discussed the results of exploration in the Hawker Creek, Adams River and Surprise Creek areas, which fall in or adjacent to the permit areas.

Prospecting Permits 886-889 are four of the fourteen permits obtained by Nanisivik Mines Ltd. in February, 1982, to protect outcrop areas of Society Cliffs Formation and anomalies recognized by the 1981 Aerodat Ltd. reconnaissance airborne geophysical survey (Gibbins, 1984, p.86).

DESCRIPTION

The permits are in the central part of the Central Borden Rift Zone of the Borden Basin (Jackson and others, 1978, 1980; Jackson and Iannelli, 1981).

This rift zone contains most of the outcrop of Society Cliffs Formation dolomite, which is the host rock of the ore at the Nanisivik mine.

Several airborne-detected geophysical anomalies (EM conductors) occur near the center of Prospecting Permit 886 (2-B2-2,4,5,5A and 7) and one near the center of the southeast quarter (2-B2-11). Two other anomalies (3-B3-11 and 4-B3-12) are found just north of the southern boundary of Prospecting Permit 889.

The northeast half and southeast corner of Prospecting Permit 886 is underlain by northwesterly trending belts of Society Cliffs Formation dolomite (Figures 4-12 and 4-13). These belts form topographic highs that are separated by the valley of the Adams River, which extends from the southeast corner to the mid-point of the western boundary of Prospecting Permit 886 and is underlain by Arctic Bay Formation shales. The northeastern belt of Society Cliffs Formation cuts diagonally across Prospecting Permit 887, from northwest to southeast, and the northeastern corner of Prospecting Permit 888. The southern belt of Society Cliffs Formation is present in most of Prospecting Permit 889 and the southwest quarter of Prospecting Permit 888.

CURRENT WORK AND RESULTS

A number of airborne geophysical anomalies were ground checked in 1982. In most cases areas of interest were gridded, prospected, geologically mapped, and surveyed by geophysical (VLF - EM and magnetometer) and geochemical techniques (copper, lead and zinc analysis of soil samples). A limited amount of IP work was done on selected grids in 1983.

All but Prospecting Permit 886 were relinquished at the end of 1983.

Prospecting Permit 886:

Several Aerodat anomalies were identified in the center of Permit 886, northeast and east of the Adams River airstrip. These targets were given the highest priority following the 1981 airborne survey, as they appeared to fall in areas of Society Cliffs Formation dolomite and possess characteristics, including conductance, consistent with the Nanisivik deposit.

The 1982 work showed that the gridded area in the center of the permit is underlain by a conformable sequence of Arctic Bay Formation shales and overlying Society Cliffs Formation dolomite and siliciclastics. These rocks are flat lying; dips are less than 10 degrees. An assumed northwesterly trending fault marks the southern boundary of the grid, with gabbro dikes filling subsidiary, parallel structures. A second set of faults trends northeasterly and offsets some of the dikes.

Lead or zinc minerals were not found in the massive or algal dolostones or clastic rocks. However, limonite-goethite boulders and cobbles were found in areas of gossanous soils, and one thin seam of pyrite was found in Arctic Bay Formation shale.

Lead and zinc geochemical anomalies were found to be closely associated with the basal Society Cliffs Formation dolomite and/or the shale-dolomite contact. On the other hand, copper anomalies tend to be related to gabbro dikes. Most magnetic highs and VLF and Max-Min EM conductors are coincident with or flank gabbro dikes, with the most conductive segments in areas underlain by Arctic Bay Formation shales.

In July, 1983, an IP chargeability/resistivity survey was conducted over the central part of the grid. A couple of areas with coincident IP, EM and zinc anomalies were recommended for drill testing.

An airborne geophysical anomaly (2-B2-11) near the center of the southeast quarter of Permit 886 was gridded, mapped and sampled. Massive, brecciated dolomites of the Society Cliffs Formation have been intruded by a northwesterly trending gabbro dike just south of the baseline. A steel-blue altered zone, produced by the intrusion, is present along the dike margin in much of the area. Four gossan zones were discovered, including one in the altered zone. "Geochemical results included spot highs, but generally low results for copper, lead and zinc, even in the gossan zones". No economic base metal sulphides were found within the gossans, however, two showings of galena and sphalerite were found in association with secondary dolomite as fracture fillings (DIAND assessment report 081722).

Four magnetic highs correspond to a gabbro dike, two spot highs and an unexplained feature. One VLF-EM conductive zone corresponds to the gabbro dike and a second zone may be related to topographic features and or underlying shales.

Prospecting Permits 887 and 888:

All of Permit 887 and the northeast half of Permit 888 lie outside of the area of the 1981 airborne geophysical survey and no physical exploration work has been done in either permit area.

A faulted inlier of Adams Sound Formation quartzite with Nauyat Formation basalt and Aphebian

basement gneiss is exposed north of Surprise Creek, which flows along the southern boundary of Permit 888. Disseminated galena and sphalerite have been observed in fracture fillings on the ROB claim (Gibbins, 1984) and minor chalcopyrite has been observed in drill core.

Prospecting Permit 889:

The permit area is almost entirely underlain by Society Cliffs Formation dolomite. A small area of Victor Bay Formation shale is exposed in the northeast corner. Several prominent west-northwesterly striking gabbro dikes cut across the area and are associated with numerous low priority airborne-detected anomalies. No base metal sulphides have been found in the permit area.

Aerodat anomalies 3-B3-11 and 4-B3-12 are contained in a small gridded area, just north of the western half of the south boundary of Permit 889 a few km northwest of the BERT claim. This area is mainly felsenmeer of Arctic Bay Formation shale, with some Society Cliffs Formation dolomite in the northwest corner. The magnetometer survey of this area outlined two gabbro dikes. A third dike is relatively non-magnetic. Moderate Fraser filter VLF EM anomalies flank gabbro dikes, with the exception of a conductor, that corresponds to the dolomite-shale contact. The most striking result of the soil geochemical survey is the enrichment of lead and zinc along the dolomite-shale contact.

In 1983 a regional stream sediment sampling program in the BERT claim - Magda Lake area included some of Permit 889. No anomalies were found on the permit.

PROSPECTING PERMIT 896

Nanisivik Mines Ltd.	Zinc, Lead
401, 44 Victoria St.	48 B/16
Toronto, Ont., M5C 1Y2	$72^{o}55'N, 84^{o}15'W$

REFERENCES

Blackadar and others (1968d); Clayton and Thorpe (1982); Gibbins (1984); Jackson and Iannelli (1981). DIAND assessment report 081742.

PROPERTY

Prospecting Permit 896	48 B/16 NE
LOIS Claim	

LOCATION

The permit is adjacent to the Nanisivik mineral leases and is centered about 14 km southeast of the mine. The LOIS claim is in the southeast quadrant of the permit area.

HISTORY

In 1981 Nanisivik Mines Ltd. undertook a reconnaissance airborne geophysical survey of the two principal outcrop belts of Society Cliffs Formation dolomite on Borden Peninsula (Gibbins, 1984). This survey was flown by Aerodat Ltd. of Toronto to discover massive sulfide deposits of the Nanisivik-type. In February ,1982, Nanisivik Mines Ltd. obtained 14 prospecting permits (including Permit 896), on the basis of the compilation and interpretation of this survey and published geological maps (Blackadar and others, 1968d).

DESCRIPTION

The permit area is underlain by strata of the Eqalulik and Uluksan Groups (Bylot Supergroup of Jackson and Iannelli, 1981). Two belts of Society Cliffs Formation dolomite cut across the northeast half of the permit. The northeastern belt is continuous with the rocks that host the Nanisivik deposits, while the southwest belt is much thinner and discontinuous. This belt is mainly exposed in mesas, surrounded by valleys with floors and walls of Arctic Bay Formation shales.

Adams Sound Formation quartzite covers much of the southwest half of the area (Fig. 4-12 and 4-13 and Blackadar, 1968d).

The only known sulphide showing in Permit 886 is massive to disseminated pyrite associated with faulting near the northern boundary of the permit and possibly related to the South Boundary Zone pyrite at Nanisivik (Clayton and Thorpe, 1982 and Chapter 2).

CURRENT WORK AND RESULTS

The Aerodat Ltd. survey revealed two conductors in the permit area in addition to those on the LOIS claims: Anomaly 6-B1-1 in the north central part of the permit and Anomaly 1-B1-4 just north of its center.

Aerodat conductor 6-B1-1 was found to be coincident with a small lake-filled valley adjacent to a major northwest-trending graben system. The conductor area was gridded and shown to be underlain by fissile black shales of the Arctic Bay Formation. Hematite-stained dolomite of the Society Cliffs Formation rests conformably on the shales to the south. A moderate VLF conductor beneath the lake corresponds to the airborne conductor and is probably

caused by conductive lake sediments. No magnetic anomalies were obtained.

The geological and geophysical surveys failed to reveal the cause of anomaly 1-B1-4, a strong Aerodat anomaly. Results of a soil geochemical survey were not encouraging.

A regional mapping and soil geochemical program revealed two areas of anomalous lead and zinc, which should be checked by VLF-EM.

The permit was relinquished at the end of 1983.

LOIS CLAIM

Nanisivik Mines Ltd.	Gold, Copper
401, 44 Victoria St.	48 B/16
Toronto, Ont., M5C 1Y2	72°55'N,84°08'W

REFERENCES

Blackadar and others (1968d); Gibbins (1984); Jackson and Iannelli (1981).

DIAND assessment report 081695.

LOCATION

The LOIS claim is 20 km southeast of Nanisivik (Fig. 4-13).

HISTORY

An airborne geophysical survey done for Nanisivik Mines Ltd. identified a strong conductive anomaly adjacent to a gabbro dike. Dike related anomalies are common in the region and it was decided to study one of these anomalies in detail. Consequently, the LOIS claim was recorded in October,1981.

DESCRIPTION

The area is situated in a portion of the Borden Basin which evolved within the North Baffin Rift Zone (Jackson and Iannelli, 1981). Strata in the area of the claim are mainly fine-grained black fissile shales of the Arctic Bay Formation. These are overlain by algal laminated and massive dolostones of the Society Cliffs Formation (Blackadar and others, 1968d). All these formations are cut by two phases of fault-controlled dikes, an older E-W Borden dike swarm and a younger NW-SE Franklin dike swarm.

CURRENT WORK AND RESULTS

Geology:

The Arctic Bay Formation, which consists of fissile black to locally graphitic shales and dolomitic shales and siltstones, is the only formation observed. This is intruded by a large westerly striking differentiated gabbro dike and a subsidiary dike located 350 m south. The main dike appears to consist of a medium-grained pinkish syenitic core flanked by a coarser and earlier green gabbroic phase, although contacts are indistinct and probably gradational. Thermal alteration along the margins has resulted in the formation of graphitic shales. Quartz carbonate stringers were found in the dike rocks with preference apparently for the syenitic phase, although they were also discovered in blocks of green gabbro. They vary up to 2.5 cm in width and contain chalcopyrite in places. One specimen assayed 5.68% Cu and 0.205 g/tonne Au.

Geophysical Surveys:

Magnetometer Survey: a magnetometer survey was carried out by taking readings at 25-metre intervals along a grid using a Geometrics G-846 Unimag II. Two major parallel magnetic trends (anomalies A and B) transect the grid from west to southeast. These strongly magnetic narrow zones averaged greater than 1500 gammas above background (58000 gammas) over their entire length. In relation to the geology they represent the magnetic expression of the gray-green blackish phase of the main gabbroic dike. The magnetic response would be due to the higher than average magnetic content in these rocks in comparison to the inner syenitic core where the magnetic data reveal a relative low with values ranging between 500 and 1000 gammas.

VLF-EM Survey: two separate VLF-EM surveys were conducted over grids. The first was completed over cross lines 200 metres apart while the second was over 50-metre lines on a small section of the western part of the grid. The aerodat survey delineated four conductors of merit. In the region of the follow-up work the conductors defined a distinct and sharp flexure not repeated over the remaining gridded area. An obvious interpretation would be faulting of the underlying strata, however, the magnetic data do not support this theory.

Max-Min: a survey with a Max-Min II unit using 100-metre and 150-metre cables at 1777 and 888 cps frequencies was carried out over portions of the grid containing the most favourable VLF-EM conductors. Both frequencies and cable lengths gave a strong electromagnetic response indicating near-surface sources over a well defined length of 1600 metres.

Induced Polarization: an IP survey was conducted on three lines parallel to the base line to try and detect anomalies corresponding to the Cu-rich quartz carbonate veinlet system previously discovered in

float. However, because of the disseminated magnetite associated with the gabbroic phase the results were inconclusive.

Geochemistry:

Soil development is poor in the grid area but soil samples collected at 25-metre intervals showed slightly anomalous Cu, Pb and/or Zn contents along the flanks of dikes and in erratic spot highs.

Conclusion:

It was recommended that the copper showing should be drilled and the syenitic core of the dike be prospected.

GULL & DEB CLAIMS

Nanisivik Mines Ltd.	Zinc, Lead
401, 44 Victoria St.	48 C/1
Toronto, Ont., M5C 1Y2	73°02'N,80°36'W

REFERENCES

Blackadar and others (1968c); Geldsetzer (1973a, 1973b); Gibbins (1984; Gibbins and others (1977); Jackson and others (1978); Lemon and Blackadar (1963).

DIAND assessment reports: 081537 (1982); 081692 (1983).

PROPERTY

GULL 1-35, DEB 1.

LOCATION

The claims are about 1.5 km south of Strathcona Sound on northern Baffin Island. They are immediately west of the Nanisivik mineral lease and 2-4 km west and northwest of the Nanisivik townsite.

HISTORY

The GULL claims were staked in 1972 to protect possible westward extensions of the Nanisivik deposit. Geological and VLF-EM surveys were done on the claims in 1974 (Gibbins and others, 1977). In 1976 a McPhar SS-15 system (vertical loop EM) detected several weak, unexplained anomalies.

In 1981, a geophysical survey, consisting of magnetic, coplanar and coaxial EM and two channels of VLF-EM, was flown at 400 m line spacings with the EM boom at 30 m height (Gibbins, 1984).

The target zone in the upper Society Cliffs Formation appears to be too deep for the airborne EM system to reach.

The DEB claim was staked in the spring of 1982.

DESCRIPTION

The region is underlain by a sequence of Helikian sediments that are generally flat lying but commonly block faulted. The most recent regional geological maps are those of Blackadar and others (1968c) and Lemon and Blackadar (1963). However, the Geological Survey of Canada has done additional mapping in the area since 1977 (Jackson and others, 1978).

The GULL claims are underlain by dolomitic shales of the lower Victor Bay Formation and dolomite of the middle Victor Bay Formation. Society Cliffs Formation dolomite, which normally underlies the Victor Bay Formation and contains the lead and zinc at Nanisivik (Gibbins and others, 1977), does not outcrop on the claims, but geological mapping and drilling to the east of the claims suggest it is present at a depth greater than 120 m. Almost 450 m of Society Cliffs Formation has been measured in the region, thus it should occur on the claims at depths between 120 and 670 m, however, extensive pre-Victor Bay karsting in the area (Geldsetzer, 1973a, 1973b) may have removed some of the Society Cliffs Formation.

Northwest-trending diabase-gabbro dikes intrude the Victor Bay and Strathcona Sound Formations in adjacent areas.

CURRENT WORK AND RESULTS

1982:

A VLF-EM survey, on Grid 82-1 along the southern boundary of the GULL claims and the DEB claim, detected moderate responses consistent with conductive overburden.

VLF-EM, Max-Min EM, IP and magnetometer surveys on the DEB and the southeast corner of the GULL claims were designed to check for possible extensions of a good conductor located just east of the GULL claims on the RAVEN claims. The results were consistent with shallow conductive overburden. The magnetometer survey did not indicate any magnetic bodies (i.e. gabbro dikes).

Exploration on the nearby RAVEN claims led to discovery of dolostone of the Society Cliffs Formation in the southeast corner of the GULL claim group. This indicated that the southern part of the group probably has only a thin cover of shale and glacial drift and may be considered for exploration for massive sulphides within the Society Cliffs Formation.

1983:

Because of the favorable location and geology, Turam and IP surveys of the DEB claim and the adjacent RAVEN claims were extended into the GULL claims, despite the fact that previous geophysical

surveys (VLF and vertical loop EM) did not yield indications of conductive sulfide minerals.

The Turam and IP surveys were done by Rayan Exploration Ltd. and compiled and interpreted by Paterson, Grant and Watson Ltd. Several drill targets were identified on the basis of two or more coincident geophysical anomalies (Turam, VLF, IP and/or resistivity).

The geology of the GULL-DEB-RAVEN area was mapped in September, 1983 by R. von Guttenburg of Metallgesellschaft Canada Ltd.

BARRIE and BIG BARRIE CLAIMS

Nanisivik Mines Ltd.	Zinc, Lead, Copper
401, 44 Victoria St.	48 A/13, B/16
Toronto, Ont., M5C 1Y2	$72^{o}59'N, 83^{o}59'W$

REFERENCES

Blackadar and others (1968a, b); Clayton and Thorpe (1982); Gibbins (1983b, 1984).

DIAND assessment report 081548.

PROPERTY

BARRIE 1, BIG BARRIE

LOCATION

The claim is 28 km due east of the Nanisivik townsite, 8-10 km south of easternmost Strathcona Sound, northern Baffin Island (Fig. 4-13).

HISTORY

High-grade lead-zinc sulphides were reported from the southern part of the present claim in 1958, but the source was not found during subsequent work. In the 1960's, the claim area and the area west of the claim were staked by Texasgulf Inc. They did geological and vertical loop EM surveys and drilled three short holes to test weak anomalies in the southwestern part of the present BARRIE claim, but no sulphides were found.

The BARRIE claim was staked by Nanisivik Mines Ltd. in 1978 to protect a pyrite outcrop. VLF and large loop (McPhar SS-15) EM surveys done during the 1979 and 1980 field seasons outlined a strong VLF anomaly separate from the pyrite body, but no corresponding vertical loop anomaly could be identified (Gibbins, 1983b). The BIG BARRIE claim was staked in 1981, to protect the area immediately west of the BARRIE claim for possible extensions of the conductive zone.

In 1981 2.5 km of VLF surveys outlined strong VLF conductors in the western claim area, where vertical loop EM surveys of 1979 and 1980 failed to identify anomalies. Normally these anomalies would be interpreted as faults or gabbro dikes, however, field evidence makes this unlikely and a series of discontinuous sulphide pods has been suggested. Two lines of radar (electromagnetic reflection) survey were run to test this hypothesis.

Two holes were drilled to test for extensions of the pyrite zone. Only one hole penetrated the Society Cliffs Formation and it intersected several narrow pyrite zones that assayed very low zinc and lead (Gibbins, 1984).

DESCRIPTION

The claim area is underlain by the Helikian Society Cliffs Formation that hosts the Nanisivik lead-zinc deposits 25 km to the west (Clayton and Thorpe, 1982 and Chapter 2). Down-warped shales of the Victor Bay Formation are exposed east of the claim (Blackadar and others, 1968a, b).

Pyrite outcrops in the Society Cliffs Formation in the northeastern part of the claim and sparse, but widespread gossans occur in the southern third of the claim area.

CURRENT WORK AND RESULTS

In August,1982, 12 holes (1,443 m) were drilled to test geophysical anomalies found in the BARRIE claim. Several pyrite intersections and one copper zone (7.4% over 5.5 m) were encountered. However, no mineralized material of economic potential was noted in any of the drilling.

The BIG BARRIE claim has lapsed.

PROSPECTING PERMITS 957-968

Petro-Canada	Lead, Zinc
P.O. Box 2844,	48 A/5,11-13, B/16
Calgary, Alta. T2P 3E3	$72^{o}15$-$45'N$,
	$82^{o}30'$-$84^{o}30'W$

REFERENCES

Blackadar and others (1968a, d); Gibbins (1984); Jackson and Iannelli (1981); Laporte (1974a, b); Sangster (1981).

PROPERTY

Twelve prospecting permits (957-968) encompassing 279,402 ha.

LOCATION

The permit areas are on the Borden Peninsula, northern Baffin Island, between Arctic Bay and Milne Inlet (Fig. 4-13). They are generally southeast of

the head of Adams Sound between longitude 83 and 84 degrees west.

HISTORY

The Geological Survey of Canada mapped the area on a reconnaissance scale (1:253,440) in the 1960's, (Blackadar and others, 1968a, d). Mineral rights to NTS areas 48 A/11-13 and B/16 were previously held by King Resources Ltd. as Prospecting Permits 86-89 between 1969 and 1972, (Laporte 1974a, b).

In 1981 Petro-Canada did lithogeochemical, prospecting and stream sediment sampling surveys in the area. The principle target was clastic and carbonate sediments of the Proterozoic Bylot Supergroup, with emphasis on assessing the metal and uranium content of black shales. No significant mineral occurrences were discovered, however, several sites of high lead and zinc content (6,000 ppm combined) were found in black shales of the Arctic Bay Formation (Gibbins, 1984, p.84).

The permits were obtained in February,1983.

DESCRIPTION

Like most of the southern Borden Basin, the permits are underlain by dark argillaceous carbonate and shale units of the Arctic Bay Formation (Table 4-9). Locally, pyritic shale is the predominant lithology, with siltstone and quartz arenite interbedded with shale in the lower part of the formation, and siltstone, dolostone and quartz arenite interbedded with shale in the upper part (Jackson and Iannelli, 1981).

The formation ranges from 500 to 770 m thick throughout most of the area. The lower contact with the Adams Sound Formation is conformable and gradational. Some shale beds contain concretions and cone-in-cone structures. White gypsum efflorescence and calcareous coatings are common on the shales and some strata emit a strong petroliferous odour.

Jackson and Iannelli (1981) distinguished four intergradational members of the Arctic Bay Formation in the area (Table 4-9). However, the entire formation is distinctly different southeast of Milne Inlet. Planar-laminated micaceous black shale predominates in the AB3 member, which is up to 400 m thick on Borden Peninsula. Jackson and Iannelli (1981, p. 279) interpreted the monotonous black shales of the AB3 member as having accumulated in shallow to deep subtidal to basinal environments.

Sangster (1981) recommended the shales of the Borden Basin and particularly the Arctic Bay

TABLE 4-9: TABLE OF FORMATIONS, BORDEN BASIN (from Jackson and Iannelli, 1981)

HADRYNIAN			Franklin Intrusions: Diabase	
		GP	Intrusive Contact	
NEOHELIKIAN	BYLOT SUPERGROUP	NUNATSIAQ	Elwin Fm. (470-1220 m):	EL_1: Quartzarenite, siltstone EL_2: Sandstone, siltstone, dolostone
			Gradational	
			Strathcona Sound Fm: (430-910 m+)	SS_6: SS_{1-5} lithologies interbedded SS_5: Polymictic conglomerate SS_4: Siltstone, greywacke SS_3: Arkose-greywacke, shale SS_2: Dolostone, dolostone conglomerate SS_1: Shale, siltstone
			Gradational	
			Athole Point Fm: (0-585 m) Limestone, sandstone, shale	
			Gradational	Gradational to Unconformable
		ULUKSAN	Victor Bay Fm: (156-735 m)	VB_2: Limestone, dolostone, flat pebble conglomerate VB_1: Shale, siltstone, sandstone, limestone
			Conformable, Abrupt to Gradational	
			Society Cliffs Fm: (263-856 m)	SC_2: Stromatolitic & massive dolostones
			Chiefly Unconformable?	
		EQALULIK	Fabricius Fiord Fm: (400-2000 m+) FF_4: Arkose, conglomerate, dolostone FF_3: Subarkose, conglomerate FF_2: Shale, quartzarenite FF_1: Quartzarenite, shale	SC_1: Stromatolitic dolostone, shale, sandstone, gypsum Gradational to Unconformable Arctic Bay Fm: (180-770 m) AB_4: Shale, dolostone AB_3: Shale, siltstone AB_2: Shale, quartzarenite AB_1: Siltstone, quartzarenite
			Conformable, Abrupt to Gradational	
			Adams Sound Fm: (0-610 m) AS_3: Quartzarenite, conglomerate, shale AS_2: Quartzarenite AS_1: Quartzarenite, conglomerate	AS_U: Quartzarenite AS_L: Quartzarenite, conglomerate
			Conformable	
			Nauyat Fm: (0-430 m)	NA_2: Plateau basalt NA_1: Quartzarenite, subarkose, basalt
			Nonconformity	
ARCHEAN-APHEBIAN			Granitic gneiss basement complex: Migmatite, foliated granitic rocks, granite, charnockite, supracrustal relics	

Formation shale as a prospective area for shale-hosted stratiform lead-zinc deposits on the basis of geology and by comparison with well-known deposits of this type. He pointed out several impressive, favorable indications in the Borden Basin, namely syn-sedimentary faulting of the Arctic Bay Formation in the North Borden Rift Zone and the possibility of second-order basins the size of individual lead-zinc deposits. He also suggested that at least part of the Borden Basin may be a lead-zinc metallogenic province, as demonstrated by the lead-zinc deposits at Nanisivik.

CURRENT WORK AND RESULTS

Most of August,1983 was spent exploring areas of Helikian Arctic Bay Formation shales for lead and zinc. Work consisted mainly of prospecting and collecting samples for heavy mineral and lithogeochemical studies. Results were not available at the time of writing.

MELVILLE PENINSULA

Mapping by Heywood (1969 and 1974) and others (Schau, 1984) shows that most of Melville Peninsula is underlain by Archean gneisses, migmatites and foliated to massive granitoid rocks. Among the oldest rocks of the region are folded and metamorphosed sedimentary and volcanic rocks of the Prince Albert Group. These supracrustal rocks are distributed in northeast-trending belts up to 20 km wide and at least 280 km along strike (Shau, 1978). Clastic metasedimentary rocks are mainly derived from greywacke and interbedded with acid to basic metavolcanic rocks and local komatiite or ultrabasics and iron formation.

The iron formation is widespread, thick and extensive (Shau, 1984) and can be readily traced on aeromagnetic maps. It consists mainly of magnetite and quartz with minor pyrite, hematite and carbonate. Some sections average as much as 30% iron. Rusty-weathering zones or gossans, commonly containing disseminated sulphides, are present in many parts of the region. Most are associated with the metavolcanic rocks of the Prince Albert Group.

The iron formation was systematically explored and staked by Borealis Exploration Ltd. in the summers of 1969 and 1970 (Wilson and Underhill, 1971; Laporte, 1974a). Aquitaine Company of Canada Ltd. explored 23 prospecting permits in southern Melville Peninsula in 1970-72 (Laporte, 1974a, b). Cominco Ltd. and Noranda Exploration Ltd. did some mineral exploration on Melville Peninsula in 1979 and 1980 respectively (Gibbins, 1983b and 1984). However, Melville Peninsula has not been the scene of many major mineral exploration projects.

ROCHE BAY IRON DEPOSITS

Borealis Exploration Ltd.	Iron, Gold
940-8th Avenue S.W.	47 A/4-6
Calgary, Alberta, T2P 1G6	68°35'N, 82°48'W

REFERENCES

Gross (1973); Heywood (1967); Laporte (1974a, 1978); Schau (1984); Underhill and Cox (1981); Wilson and Underhill (1971).

PROPERTY

IAN 1-6	47 A/4
DON 1-24	47 A/5, 6
JEF 1-46, LIZ 1-55	47 A/6
BSX 2-25	47 A/6

LOCATION

The claims are west and southwest of Roche Bay, east-central Melville Peninsula, 80-100 km southwest of the nearest community of Hall Beach (6 in Fig. 4-1). The A, B, C, D and E deposits are 10 and 11 km northwest, 10 km west, 16 km west-southwest and 45 km southwest of the mouth of the Ayergotadlik River respectively.

HISTORY

The claims were staked between 1968 and 1970, following the release of government aeromagnetic maps. Reconnaissance and detailed magnetometer and geological surveys, channel and bulk sampling of iron formation were also done at this time.

Nine iron deposits were outlined in the western part of Melville Peninsula and five in the eastern part (Laporte, 1974a). Metallurgical tests indicate that a magnetite concentrate of 68 to 70 percent soluble iron can be produced without the use of flotation cells.

Three sections were channel-sampled in 1975; one 170-m-long section on the IAN claims, one 215-m-long section on the LIN claims and one 430-m-long section on the DUG claims. Analysis of the samples gave results similar to that of the 1969-70 work (Laporte ,1978, p.22).

In 1981 the management of Borealis Exploration Ltd. announced plans to place the eastern Melville Peninsula (Roche Bay) iron deposits into production with the first shipment of ore in 1985 (Underhill and Cox, 1981).

The BSX claims were added in the spring of 1982.

DESCRIPTION

The claims cover parts of a 6 - 11 km wide, 75 km long north-northeast-trending belt of Prince Albert Group metasediments and metavolcanics. Five deposits of iron formation, each at least 125 m wide and over 1,250 m long, were outlined in the main belt and a smaller belt six km to the southeast. The thinly laminated to massive iron formation consists of alternating laminae of magnetite or quartz-magnetite and quartzite.

The Melville Peninsula iron formation is of the 'Algoma type' (Gross, 1973), which is intimately associated with various volcanic rocks including pillowed andesites, tuffs, and pyroclastic rocks and related sedimentary rocks including greywacke, grey-green slate, or black carbonaceous slate. Tuff and

fine-grained clastic beds or ferruginous cherts are interbedded in the iron-formation. The associated rocks indicate a eugeosynclinal environment for their deposition because of their close relationship in time and space to volcanic activity.

The regional geology of the Prince Albert Group of Melville Peninsula has been mapped and described by Heywood (1967 and 1984) and Shau (1984). Wilson and Underhill (1971) described the iron deposits. A resource of 1.1 billion tonnes of 25 to 30 percent iron has been estimated for the 5 deposits of eastern Melville Peninsula (Roche Bay area).

CURRENT WORK AND RESULTS

1982:

The A (or Adler) and B deposits were tested with 3,500 m of diamond drilling. About 2 km of strike length was drilled at 600 m or less spacing. One hole was completed in the C deposit. All the core was logged and all iron formation was split and assayed. In addition, a 58.5 tonne bulk sample was collected and shipped out for metallurgical tests. Assays showed that the grade of the C deposit was better than the A and B deposits.

A small geological crew carried out geological and magnetometer surveys and some geotechnical work was started.

1983:

After the Ontario Research Foundation determined the presence of trace amounts of gold and silver in the tailing of the iron formation, the 1982 core was re-logged and additional sections were logged and sent for gold-silver assays. Gold was also indicated in the magnetite concentrate (Skilling's Mining Review - December 10, 1983).

A small geological crew did detailed mapping of the A, B and C deposits and Paleozoic carbonates near Roche Bay during the field season. However, most of the company's effort was directed towards the construction of 11 km of roads and a 30 by 1380 m airstrip suitable for Hercules aircraft.

Several prospecting permits, covering the southwesterly extension of the Prince Albert Group, were obtained by Borealis Exploration Ltd. in February, but it is believed that no work was done on these permits in 1983.

COAL IN THE ARCTIC ISLANDS

Coal was discovered and used by several 19th and early 20th century naval and whaling expeditions to the Arctic Islands. For example: "The coal seam of Watercourse Valley (Northeastern Ellesmere Island) was discovered by members of the Nares expedition (1875-1876) and a small tonnage was mined and used. Subsequent parties also have mined and burned some of the coal." (Christie, 1964, p. 59). Minor quantities of coal have been mined for local use at Hudson's Bay Co. and RCMP posts and Christian missions at Pond Inlet, Northern Baffin Island and at Aklavik and Paulatuk on the NWT mainland.

Arctic coal is found mainly in four stratigraphic units: Eureka Sound Formation (uppermost Cretaceous-Lower Tertiary), Hassel Formation (Middle Cretaceous), Isachesen Formation (Lower Cretaceous) and Heiberg Formation (Upper Triassic-Lower Jurassic). The coal-bearing Eureka Sound Formation is the only unit with major coal resources. Although it is widespread throughout the Arctic Islands, the most promising area is on east-central Axel Heiberg Island and southwestern Ellesmere Island, particularly the Fosheim Peninsula near Eureka (Fig. 4-14). The large inferred coal reserves of this area range in rank from lignite through sub-bituminous to high-volatile bituminous.

In many parts of the Arctic Islands, the lateral continuity of coal seams is clearly visible on the landscape due to the dark colour and prominent, resistant nature of coal relative to the light-coloured and weakly consolidated clastic sediments of the enclosing Eureka Sound Formation. However, measured seam thicknesses may not always be accurate, because of slumping on slopes.

Brief reviews of coal in Northern Canada are given by Woodward (1976) and Allen and Dyson (1976).

The rapidly increasing prices of coal and other fuels in the late 1970's, improvements in technologies of in-situ coal gasification and synfuel processes and a recent publication concerning the coal resources of the Eastern Arctic Archipelago (Bustin, 1980) caused renewed interest in Arctic coal resources. This interest became evident in the spring of 1981, when 145 coal licences covering much of the

Fosheim Peninsula of Ellesmere Island and easternmost Axel Heiberg Island were granted. Petro-Canada obtained 110 coal licences, Gulf Canada Resources Inc. were granted 20 and Utah Mines Ltd. 11. Initial reconnaissance exploration involving mapping, measuring stratigraphic sections and sampling, was completed in 1981 (Gibbins, 1984). Subsequently, Utah Mines Ltd. relinquished four coal licences in the Strathcona Fiord area (157-159 and 162). These areas were then granted to Petro-Canada Exploration Ltd. in May,1982 (Coal Licences 334-337).

Gulf Canada Resources Ltd. relinquished 10 coal licences on Axel Heiburg Island and its two northernmost licences on Fosheim Peninsula (184-185). In August,1983 Petro-Canada was granted 10 coal licences (338-347) in the Stenkul Fiord area of southern Ellesmere Island. By the end of 1983, Gulf Canada Resources Ltd. retained 8 of 20 coal licences, Utah Mines Ltd. retained 7 of 11, and Petro-Canada Exploration Ltd. 31 of 124 (Fig. 4-15). This reduced Petro-Canada's holdings to 461,344 ha from 1,852,814 ha.

A coal licence grants the licensee the exclusive right to prospect for coal within an area designated as one quarter of a mineral claim staking sheet or NTS block for three years, provided the licensee spends in exploration work the amounts of five, ten and twenty cents per acre in the first, second and third years respectively. The Territorial Coal Regulations, which govern coal mining rights in the NWT and Yukon, are expected to be amended in the future.

Prior to April,1981, only 1 of 156 coal licences granted by DIAND pertained to an area in the Arctic Islands. This exception was Coal Licence 2 (NTS 79 D/1 NE,Lougheed Island) granted to King Resources Co. December,1968. However, 155 of 190 coal licences, granted between May,1981 and August,1982, are in the

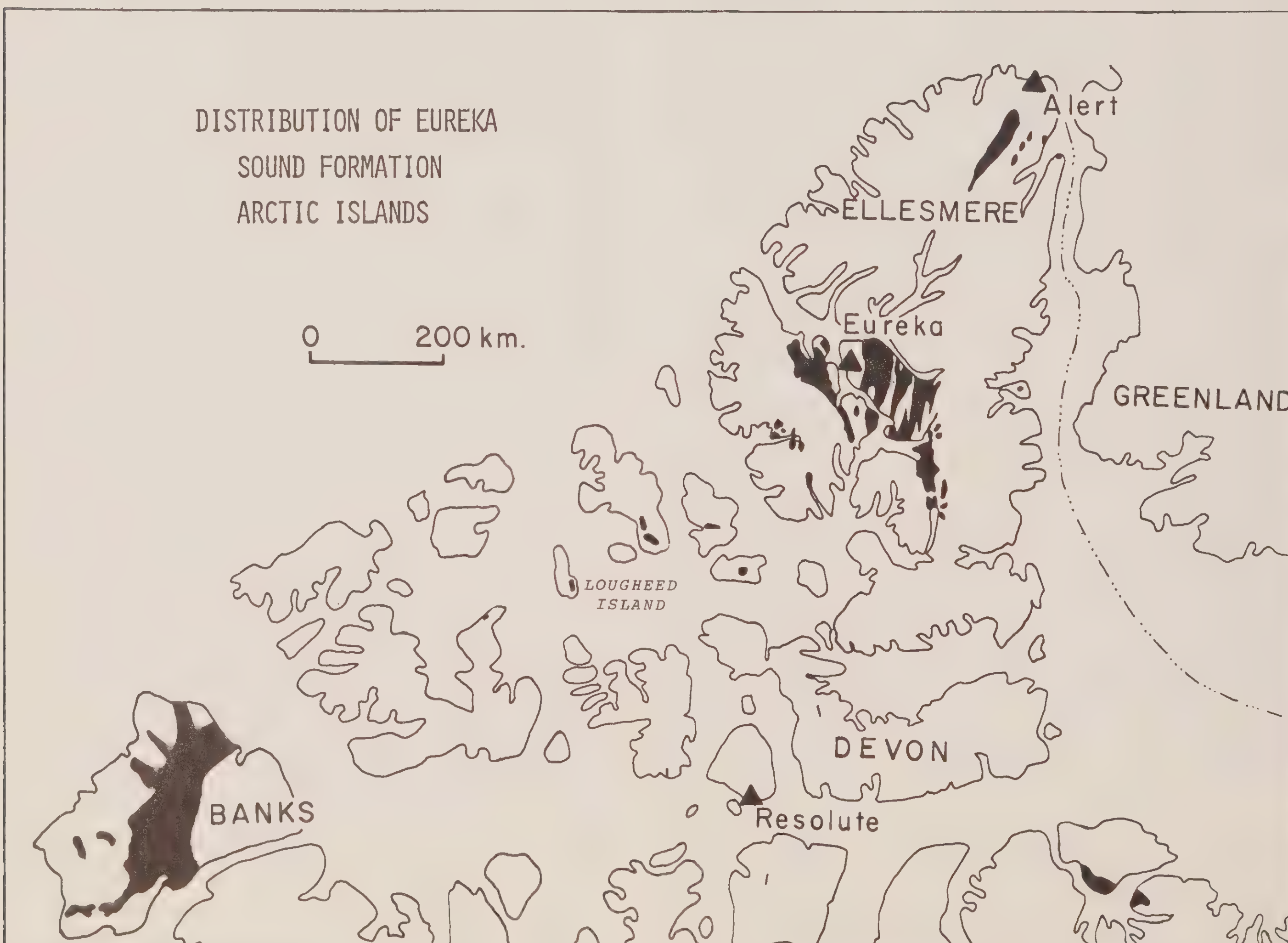

FIGURE 4-14: Distribution of Eureka Sound Formation, Arctic Islands

Arctic Islands, specifically Ellesmere and Axel Heiberg Islands. More than half a million dollars was spent on coal exploration in the Arctic Islands in 1981, more than one million in 1982 and three quarters of a million in 1983.

Petro-Canada was the only company exploring and evaluating coal resources of the Arctic in 1982 and 1983. Field work consisted mainly of prospecting, mapping and measuring, describing and sampling sections of coal-bearing Eureka Sound Formation.

All coal seams with a true thickness greater than 1.0 meter were sampled. Rock splits with a true thickness over 25 centimeters were sampled separately. Due to the numerous seams greater than one meter in some sections, random selections of seams were made from the base to the top of the section due to time and cost restraints. The presence of permafrost less than a half meter below surface made sampling into fresh, unweathered coal seams often difficult. Every coal seam was measured, logged and recorded.

ELLESMERE AND AXEL HEIBERG ISLANDS

Ellesmere and Axel Heiberg Islands of the eastern Canadian Arctic Archipelago are underlain by two major sedimentary basins, the Sverdrup Basin (Fig. 4-16) and the Franklin Basin (Fig. 4-17) (Stuart Smith and Wennekers, 1977 and Thorsteinsson and Tozer, 1970). The Franklin Eugeosyncline was the site of more or less continuous sedimentation between late Precambrian and late Devonian time (Thorsteinsson and Tozer, 1970, p. 551). The most important tectonic event that affected the Franklin Miogeosyncline was the Ellesmerian Orogeny of late Devonian or early Carboniferous age.

The Sverdrup Basin is a successor basin superimposed on the Franklin Geosyncline. It contains an essentially concordant succession up to 13,000 m thick of Lower Carboniferous to Tertiary, marine and nonmarine sedimentary rocks, basalt flows and gabbro dykes and sills (Fig. 4-16). "The basin evolved in five phases: (1) late Paleozoic, when evaporites and marine muds were deposited in the axial region and carbonates and mature sands on the margins; (2) early Mesozoic, when great thicknesses of siltstone and shale accumulated in axial parts of the basin; (3) middle Mesozoic, when terrigenous clastic deposits accumulated slowly; (4) late Mesozoic, when clastic deposits widely overstepped former basin margins; and (5) late Mesozoic-Cenozoic, when the basin underwent several stages of tectonism (Eurekan Orogeny)." (Balkwill, 1978, p. 1004).

During the Eurekan Orogeny, compression was confined to the eastern Arctic, primarily Ellesmere and Axel Heiberg Islands. Elsewhere, the Sverdrup Basin and adjacent areas were disturbed by broad

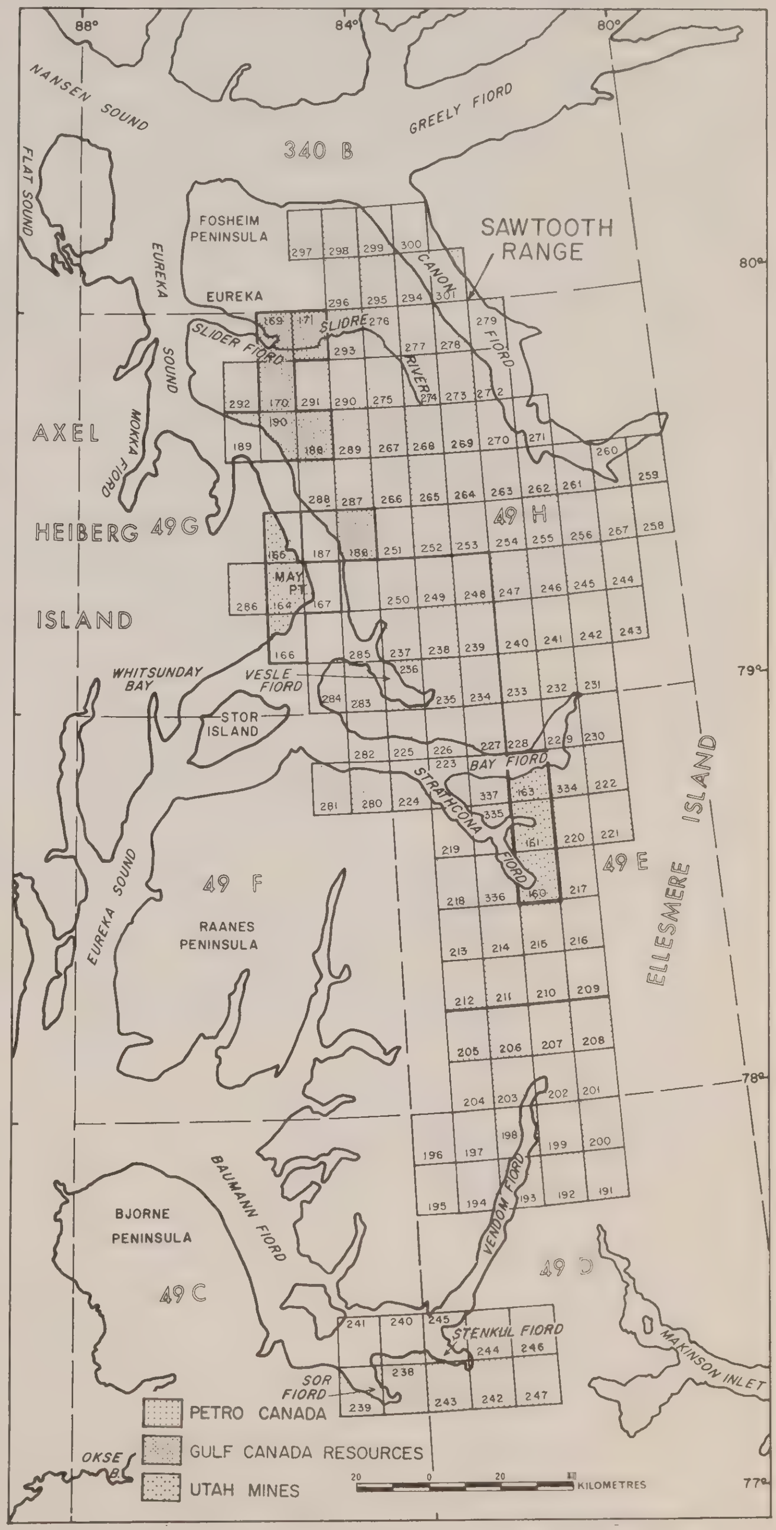

FIGURE 4-15: Coal licences, Ellesmere and Axel Heiberg Islands, 1982-83

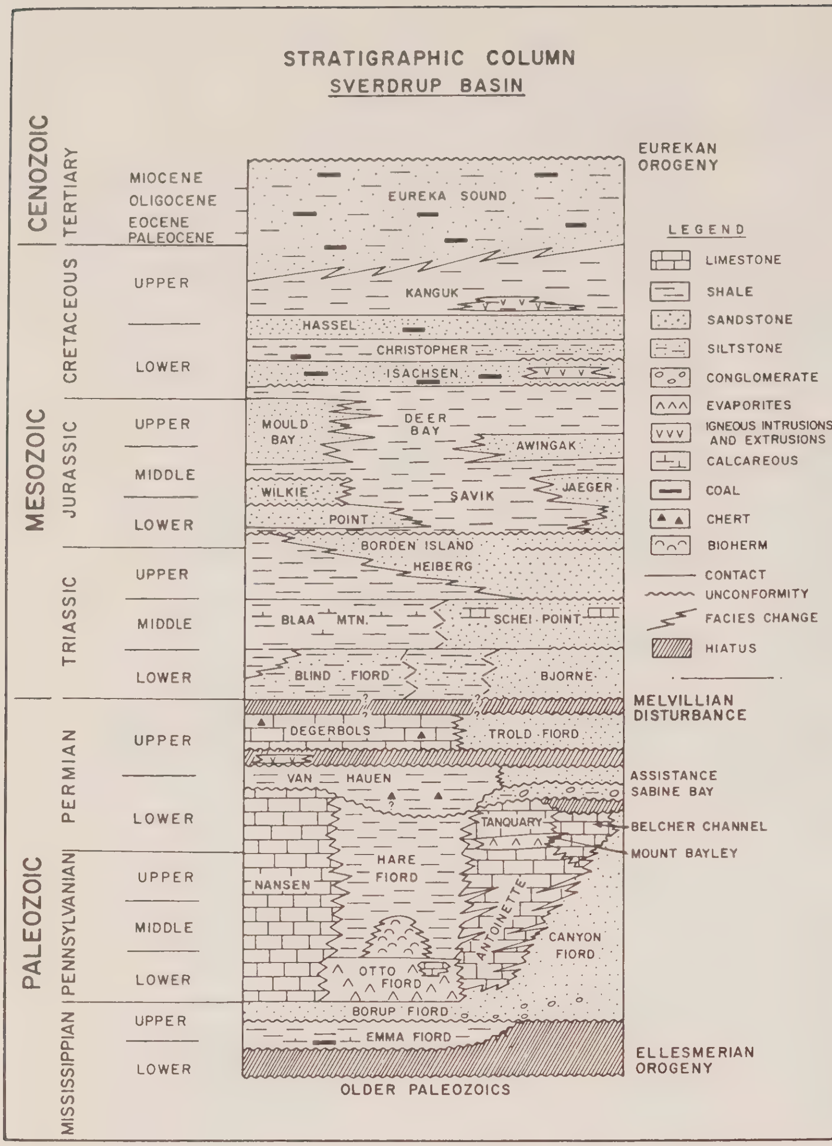

FIGURE 4-16: Stratigraphic column Sverdrup Basin (from Stuart Smith and Wennekers, 1977)

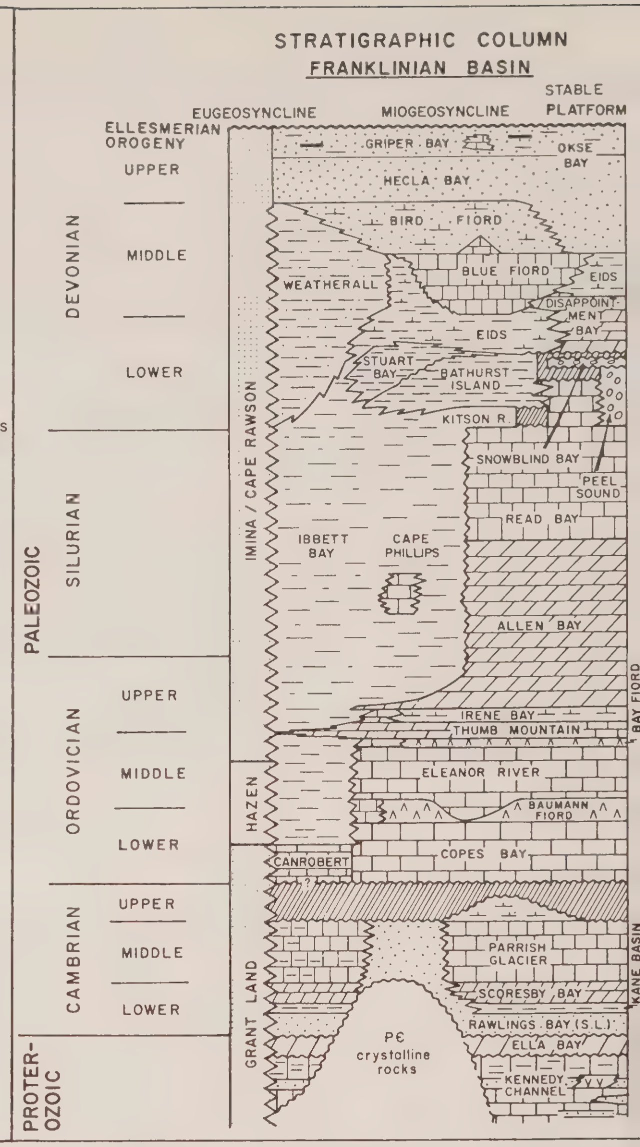

FIGURE 4-17: Stratigraphic column Franklin (from Stuart Smith and Wennekers, 1977)

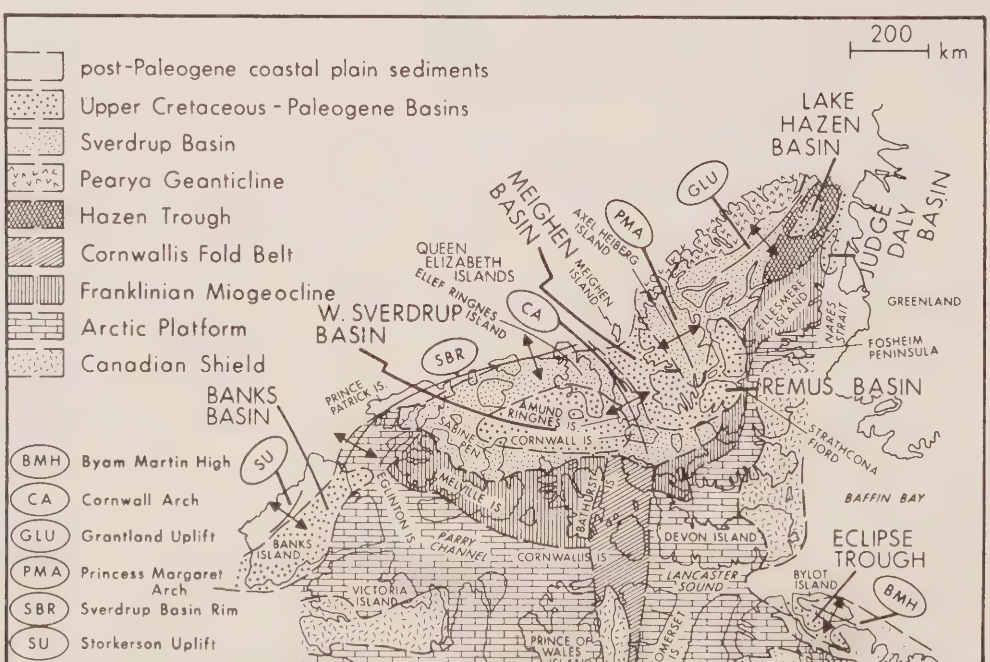

FIGURE 4-18: Structural stratigraphic units in the Canadian Arctic Islands, showing location of Upper Cretaceous-Paleogene basins (from Miall, 1981)

uplifts and downwarps. A series of smaller basins were formed and these were filled by debris shed from adjacent intrabasin upwarps and fold belts. These basins include the Banks, West Sverdrup, Meighen, Eclipse, Lake Hazen and Judge Daly Basins (Miall, 1981 and Fig. 4-18). The Eureka Sound Formation, which fills them, was formed during the early stages of the Eurekan Orogeny and can be correlated in part with seafloor spreading events.

The Remus Basin, centered on Fosheim Peninsula and easternmost Axel Heiberg Island, has attracted most of the interest of coal exploration groups, but the Banks, Lake Hazen and Judge Daly Basins (Fig. 4-18) also contain coal and have been looked at as well. The Remus and Banks Basins contain mainly deltaic-marine fill, while the Lake Hazen and Judge Daly Basins are mainly fluvial lacustrine (Miall, 1981).

Initial deposition of the Eureka Sound Formation marked the end of uniform subsidence of the Sverdrup Basin and the beginning of the Eurekan Orogeny. Late Cretaceous uplift resulted in the formation of broad, partly fault-controlled arches and fold belts of considerable topographic relief, resulting in synorogenic and possibly post-orogenic deposition of the Eureka Sound Formation. In the Remus Basin, deposition took place in alluvial plain, delta transition and marine environments or facies, as indicated by position in the stratal succession, gross lithology, sedimentary and biogenic structures, mineralogy and fossils (Bustin, 1977).

Deformation in the Remus Basin reached a peak with mid-Cenozoic folding and faulting. Eurekan structures were superimposed with concordant trends on older Ellesmerian structures but were not confined to areas deformed during Paleozoic times. South of Bay Fiord many thrust faults cut strata ranging in age from late Paleozoic to Cenozoic, and commonly the fault planes follow Carboniferous evaporites. The thrust faults are usually low angle and generally have their hanging walls displaced towards the east. Normal faults are common in areas affected by the Eurekan Orogeny. Some normal faults are at least Eocene in age and probably younger as they are observed cutting the youngest Eureka Sound Formation sediments in the area. The normal faults are usually very steep and their displacements appear mainly to be small.

"Major coal resources occur within the late Cretaceous and Tertiary Eureka Sound Formation. The formation, which ranges in thickness from thin erosional outliers on central Axel Heiberg Island to a maximum thickness of 3,300 m on Fosheim Peninsula, Ellesmere Island, contains numerous thick seams of coal. The coal is highly variable in quality, but seams of clean, vitrain-rich coal several metres thick are present. The rank of the coal ranges from lignite through sub-bituminous to high-volatile bituminous as measured by vitrinite reflectance. Inferred resources within the area of study are calculated as 30,000 million tonnes of which 15,000 million tonnes are lignite, 11,000 million tonnes are sub-bituminous and 4,000 million tonnes are high-volatile bituminous." (Bustin, 1980, p. 38). Axel Heiberg and Ellesmere Islands encompass only a small portion of the outcrop of Eureka Sound Formation and of the other coal measures of the Arctic Archipelago, and considerable additional coal resources will undoubtedly be found (Fig. 4-14 and Miall, 1981).

Good quality 1:250,000 scale geological maps have been published for most of Axel Heiberg and Central Ellesmere Island by the Geological Survey of Canada (Thorsteinsson,1971 a-c, 1972 a-d).

FOSHEIM PENINSULA WEST COAL LICENCES

Petro-Canada	Coal
Coal Division	49 G,H;340 B
P.O. Box 2844	
Calgary, Alta., T2P 3E3	

REFERENCES

Bustin (1977, 1980); Miall (1981); Thorsteinsson (1971b, 1972b, 1972d, 1972e).

DIAND assessment report 062157.

PROPERTY

Fosheim Peninsula coal licences are those numbered 266 to 268, 273 to 278 and 287 to 300. The 23 licence areas are shown on Fig. 4-15.

LOCATION

The 23 coal licences are on Fosheim Peninsula, west-central Ellesmere Island. Eureka, on the north shore of Slidre Fiord, is on the west side of the peninsula, but the Eureka Sound Formation is present mainly in the central and eastern area (Figs. 4-14 and 4-19).

HISTORY

Bustin (1980) estimated the coal resources of the Fosheim Peninsula area to be in the order of 21,000

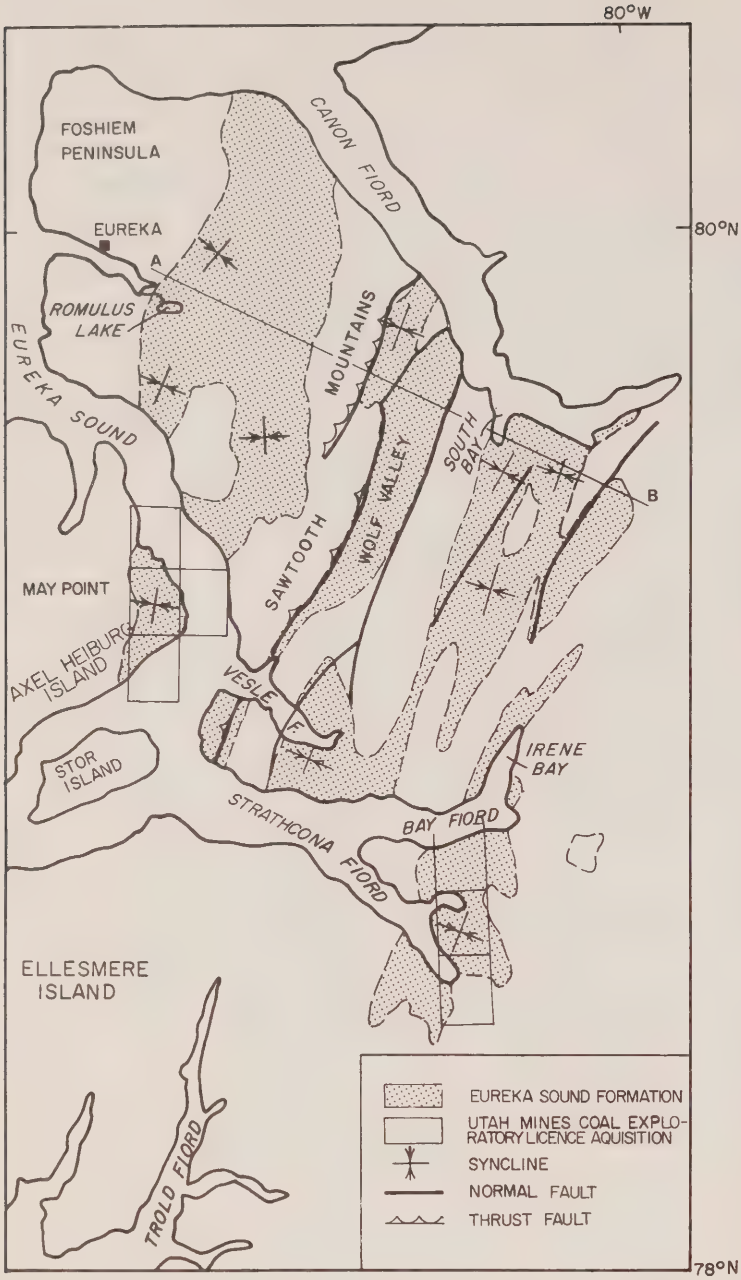

FIGURE 4-19: Distribution of Eureka Sound Formation in the Fosheim Peninsula, cross-section A-B is given in Figure 4-21

million tonnes. In 1981, measurement and analysis of several additional coal-bearing sections confirmed Bustin's estimate.

The coal licences were granted by DIAND July 16, 1981.

DESCRIPTION

The regional structure comprises a broad northerly trending synclinorium (Thorsteinsson, 1972e), or the Remus Basin (Miall, 1981), with broad gently northerly plunging anticlines and synclines and northerly trending normal faults (Figs. 4-20 & 4-21). It has been referred to informally as the Fosheim Synclinorium. The Eureka Sound Formation (Te) conformably overlies Upper Cretaceous shales of the Kanguk Formation (Kk) along the east and west limbs of the synclinorium. Over 3,300 m of coal-bearing Eureka Sound Formation is exposed in a section along Remus Creek on the west flank of the synclinorium. Bustin (1980) measured 28 seams greater than 1 metre and up to 10 m thick in this section. He also pointed out that, "In general the thickness and quality of the coal seam deteriorated from the base to the top of the section. Coal seams at the base of the coal measures are clean, massive with little finely divided argillaceous material and few discrete rock bands. Towards the top of the coal measures, particularly in the upper 1,000 m, the coal is commonly argillaceous and granular, and in some areas gradational to carbonaceous mudstones and shales." Bustin (1980, p. 44).

At one locality a thick (5 m) seam of anthracite is exposed in a cliff near a small creek. Leaf imprints, branches, and in-situ roots of Metasequoia are fairly common, as are 'clinkers' of oxidized or 'burnt' coal. The latter are easily identified by their distinctive red colour in contrast with the normal buff colour of the countryside.

The Eureka Sound Formation consists of roughly 3,300 meters of clastic and minor marine sediments in the region of Fosheim Peninsula. This thins southward to approximately 2,500 meters in the vicinity of Strathcona Fiord. The lithologies consist of fine to coarse-grained sandstones, siltstones, carbonaceous and micaceous claystones, shales, coals and limestones.

West of the Sawtooth Mountains the property is characterized by gently undulating plains ranging in elevation from sea level to a maximum of 300 meters. The area is bisected by the Slidre River flowing from east to west, which is fed by meltwaters from the snowfields of the Sawtooth Mountains. The Slidre River has a broad meandering valley and its northwest and southeast trends are probably bedrock controlled. Tributaries of the Slidre River flow mainly in a north-south pattern and are typically steep walled and narrow. The area between the streams is gently rolling tundra covered with soil polygons commonly up to 50 meters in diameter.

CURRENT WORK AND RESULTS

The Eureka Sound Formation on Fosheim Peninsula-West was shown to be 3,200 meters thick and coal-

bearing throughout. Multiple seams up to fifteen meters in thickness exist in the area. The rank of the seams range from high volatile 'C' bituminous at the base of the section to lignite at the top. The coal seams are laterally persistent and can be traced up to fifteen kilometers along strike. The quality of a fifteen-meter seam near the top of the formation yielded 17,267 KJ/kg, 0.34% sulphur with 7.0% ash on an as-received basis. Inferred coal resources within 200 meters of surface were estimated to be in the order of 21,000 million tonnes. Petro-Canada's 1982 efforts have resulted in a slightly revised figure of 21,900 million tonnes in the inferred category.

The composition of the coal suggests that peat was deposited in a forest moor environment (Bustin, 1977). Judging by the lateral continuity, thickness and absence of partings in most of the observed seams, it is apparent that coal-forming swamp conditions prevailed over large areas of the flood plain. Laterally persistent ironstones overlay many of the seams suggesting that swamp conditions at these localities were terminated by submergence as lakes formed.

The distribution of the coal seams within the Eureka Sound Formation is variable from area to area due to the different facies at each locality. The alluvial plain facies, which is the main coal-bearing facies, also changes character thereby affecting the percentage of coal in the section.

Six marginal coal licences were relinquished in 1983, leaving 17 in good standing.

FOSHEIM PENINSULA-EAST COAL LICENCES

Petro-Canada	Coal
Coal Division	49 E, H
P.O. Box 2844	$76^{o}52'$-80^{o}N
Calgary, Alta., T2P 3E3	80^{o}-84^{o}W

REFERENCES

Gibbins (1984); Thorsteinsson (1972c, 1972d).
DIAND assessment report 062157.

PROPERTY

Petro-Canada Exploration Ltd.'s Fosheim Peninsula-East area includes 34 coal licences as shown in Fig. 4-15. These are numbered 228-233, 240-247, 251-265, 269-272 and 279.

LOCATION

The Fosheim Peninsula-East area lies southeast of the Sawtooth Range, between Bay Fiord to the south and Canon Fiord to the northeast (Fig. 4-22). Eureka is 75 to 150 km to the northwest.

HISTORY

The 34 coal licences were granted in July,1981. In 1981 a number of sections of Eureka Sound Formation were measured and coal seams were sampled. The quality of the coal is highly variable, from lignite to high-volatile bituminous C with 10 to 23% ash. Significant coal does not occur in the basal part of the Eureka Sound Formation. A few thick seams occur locally in the upper part, but large coal reserves are not likely to exist east of the Sawtooth Range (Gibbins, 1984).

DESCRIPTION

East of the Sawtooth Mountains the Eureka Sound Formation is distinct lithologically and sedimentologically from Tertiary strata deposited west of the mountains. The formation is composed of non-marine clastics as well as shallow marine sediments and includes at least one major transgressive interval. Tertiary strata gradually overstep progressively older formations towards the east margin of the Sverdrup Basin (Fig. 4-20).

Generally speaking the area is characterized by several large overthrusts which place strata as old as Ordovician on Tertiary Eureka Sound Formation. The overthrusts are generally low angle and have hanging walls displaced towards the east. The faults strike northeast and are thought to be rooted in Carboniferous evaporites (Thorsteinsson, 1972c, d). They are related to the Eurekan Orogeny and are most likely late Eocene to Miocene in age.

The trend of the normal faults are roughly parallel to the compressional faulting. Most of the normal faults are steep and have hanging walls down dropped towards the centre of the Sverdrup Basin. The normal faults are thought to have been formed during the Ellesmerian Orogeny and have been reactivated during the Eurekan Orogeny.

The folding confined to the Eureka Sound Formation is generally broad and open with rounded hinges. Dips rarely exceed 40^{o} and are usually in the 10^{o} to 30^{o} range. Most of the larger folds plunge towards the north at shallow angles. Structurally this area is the most complex of all the areas in Petro-Canada's coal licences.

In contrast to the area west of the Sawtooth Mountains, the topography east of the mountains is completely rugged. This area is typically mountainous

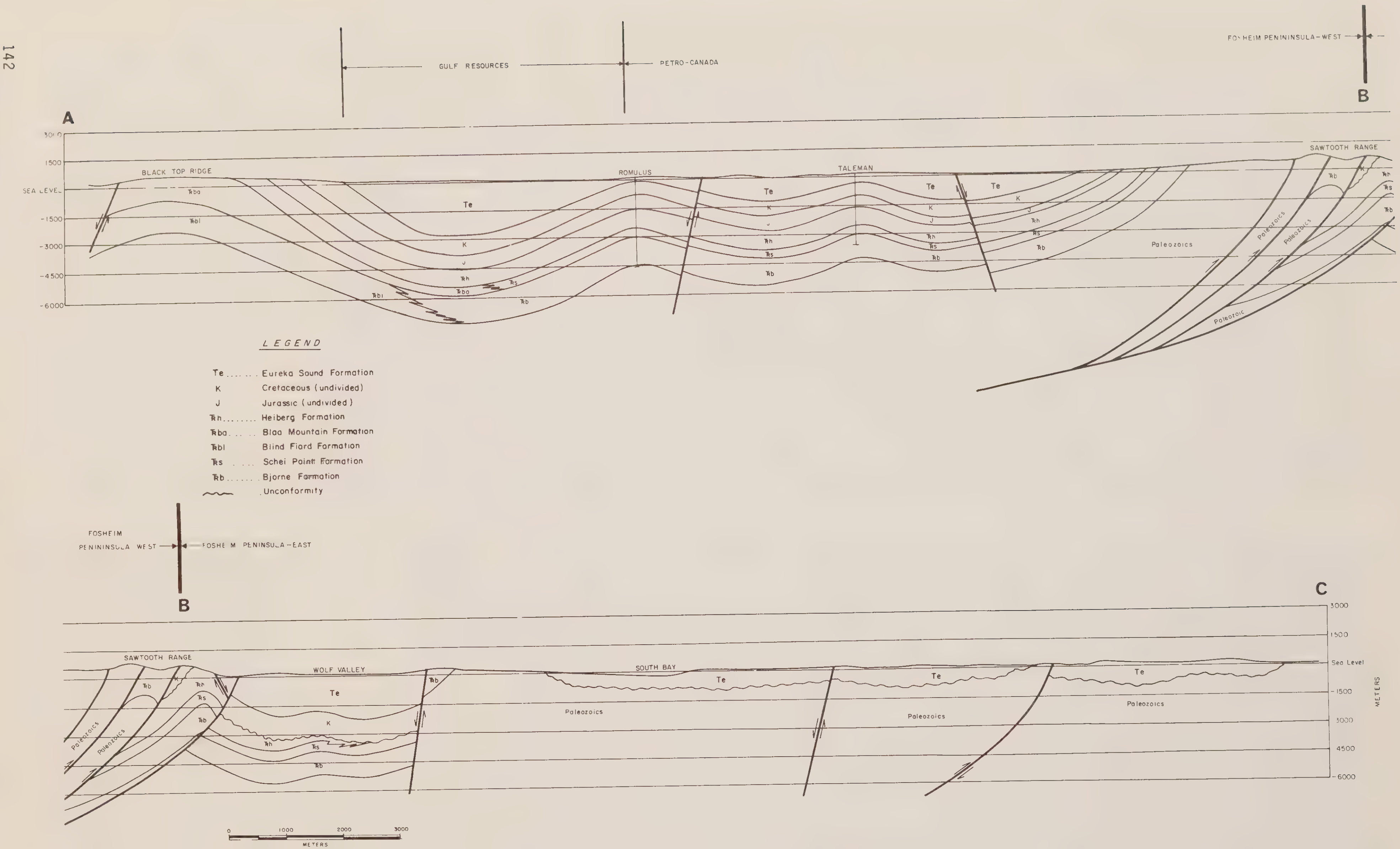

FIGURE 4-20: Cross-section Fosheim Peninsula west and east (from DIAND assessment report 062157)

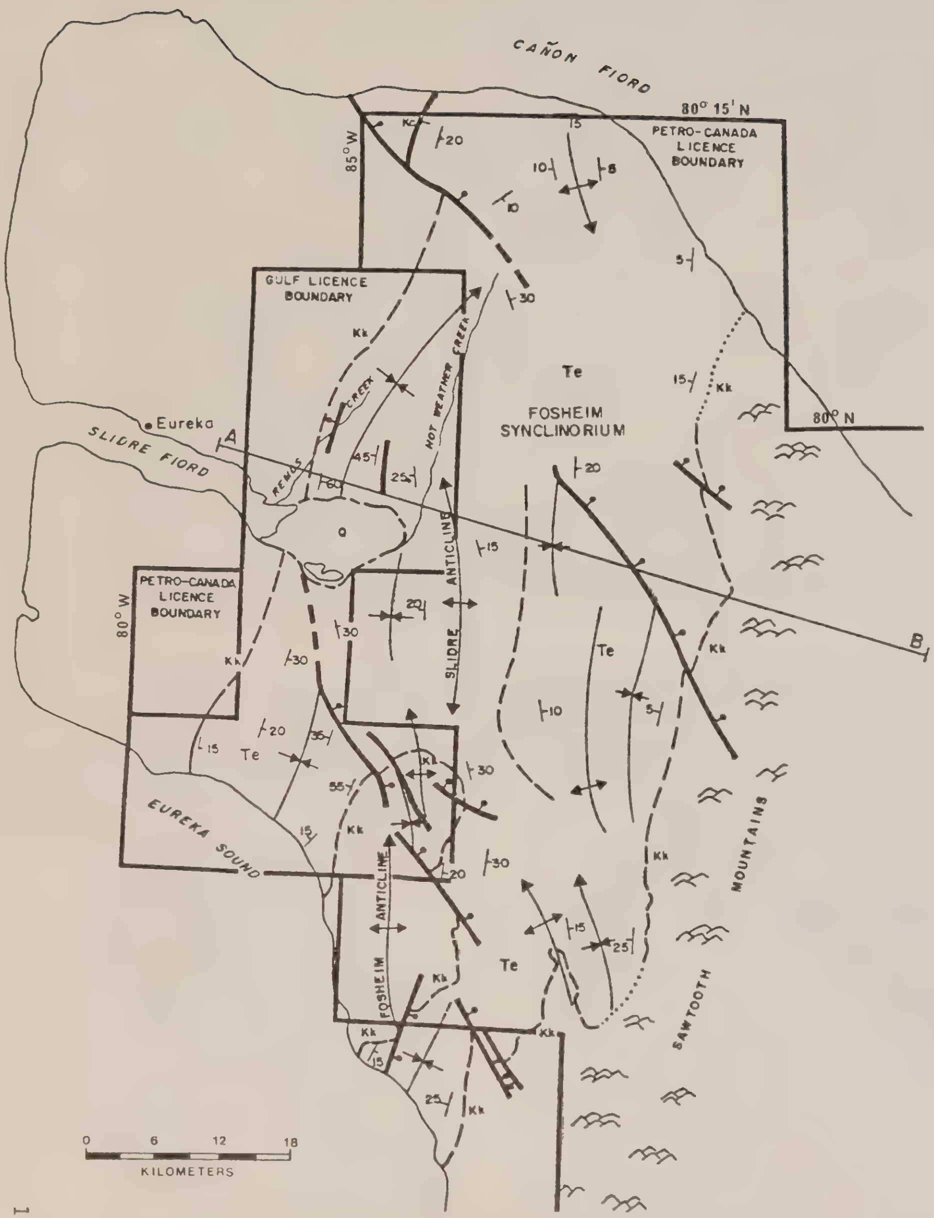

FIGURE 4-21: Geology of Fosheim Peninsula West (from DIAND assessment report 062157)

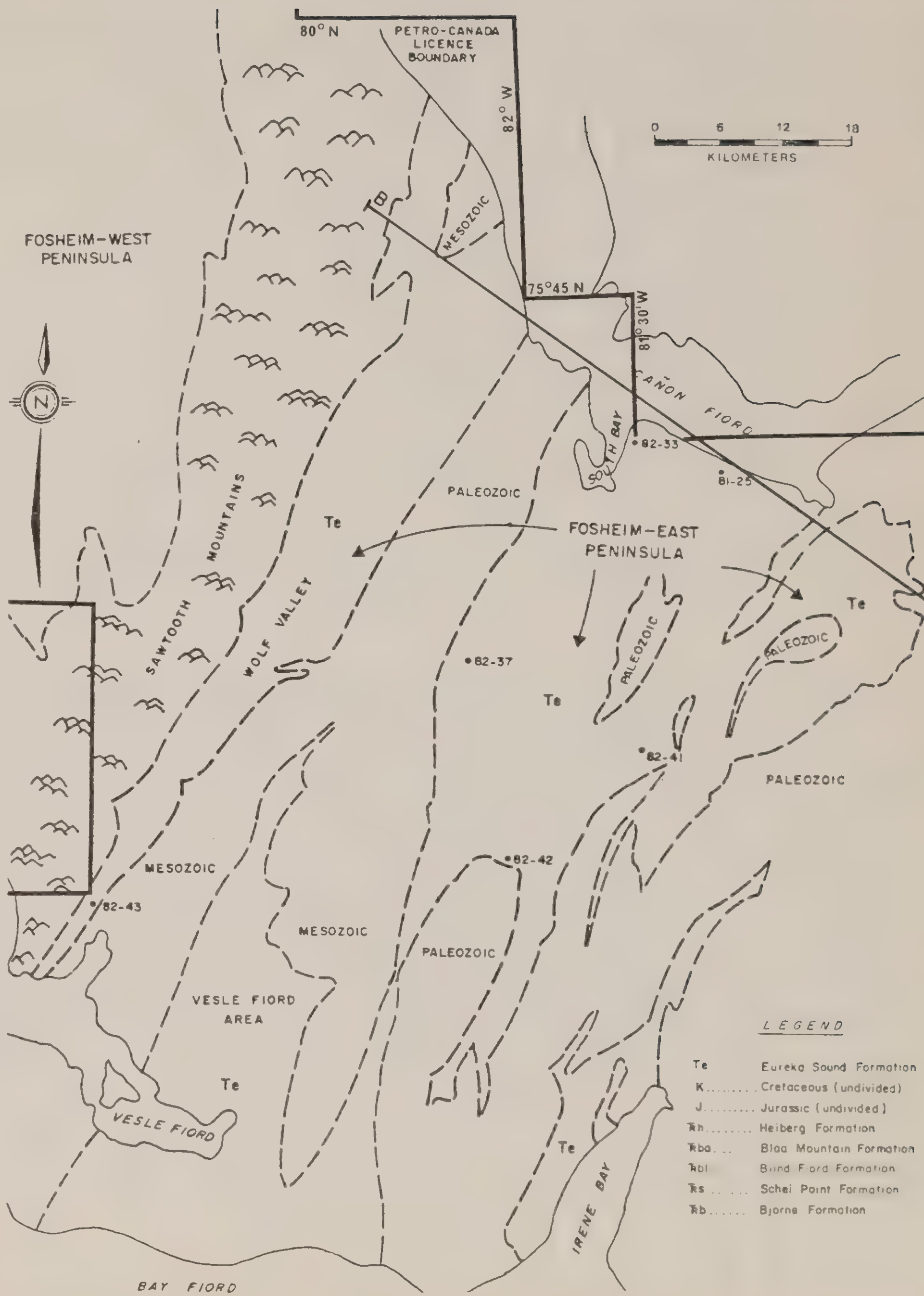

FIGURE 4-22: Schematic geology map of Eureka Sound Formation on east Fosheim Peninsula (from DIAND assessment report 062157)

and has numerous broad plateaus incised by streams. Valleys between the mountains and plateaus are commonly glaciated. The mountains reach a maximum elevation of 1,400 meters with many capped by permanent icefields.

CURRENT WORK AND RESULTS

The Eureka Sound Formation was examined at approximately 30 localities east of the Sawtooth Mountains. At each locale the formation was measured and samples of coal seams were taken. Generally there was a greater proportion of medium to coarse-grained sandstone east of the mountains and all the lithologies are better indurated than to the west. There is also a relatively greater percentage of higher flow regime sedimentary structures.

Reconnaissance exploration in the past had indicated that the Eureka Sound Formation in this area was entirely of terrestrial origin. However, the 1982 program came across a 200-300 m thick claystone unit of marine origin not previously reported. The high percentage of coarse clastics associated with the predominance of anastomosing and meandering stream deposits, a marine unit and the virtual absence of thick coal seams indicates the depositional environments were not conducive to stable coal-forming swamps in this area.

Most of the coal seams appeared to have high ash content and were less than one meter in thickness. Due to the paucity of one meter plus coal seams east of the Sawtooth Mountains sampling was limited to only four seams. Their average rank is approximately sub-bituminous "B".

East of the Sawtooth Mountains significant coal resources do not occur in the Eureka Sound Formation. The paucity of seams over one meter in thickness has precluded any resource calculations in this area. All 34 coal licences were relinquished in 1983.

COAL LICENCE #286 - MAY POINT

Petro-Canada	Coal
Coal Division	49 G/7
P.O. Box 2844	79°37'N,85°45'W
Calgary, Alta., T2P 3E3	

REFERENCES

Bustin (1980); Gibbins (1984); Thorsteinsson (1972b).

DIAND assessment report 062157.

PROPERTY

Coal Licence 286 49 G/7 SW

LOCATION

Axel Heiberg Island is in the north-central Arctic Archipelago. Petro-Canada Ltd.'s single coal licence on Axel Heiberg Island is several km west of May Point and is bordered by Utah Mines Ltd.'s Coal Licence 164 on its eastern side and Gulf Canada Resources Ltd.'s Coal Licence 168 to the south (Fig. 4-15).

HISTORY

Petro-Canada Ltd.'s Coal Division became interested in the coal potential of Axel Heiberg Island after Bustin (1980, p. 48) published a report that estimated the coal resources of Eastern Axel Heiberg Island to be in the order of 9,000 million tonnes of lignite, sub-bituminous and high volatile bituminous. In 1981 Petro-Canada Ltd. did reconnaissance exploration of coal beds in the western and eastern parts of Ellesmere Island.

Petro-Canada Ltd., Utah Mines Ltd., and Gulf Canada Resources Ltd. all explored coal licences near May Point, eastern Ellesmere Island in 1981 (Gibbins, 1984).

DESCRIPTION

Axel Heiberg Island is divided into two structural domains by the southeasterly plunging Princess Margaret Arch - a major structural and topographic high that extends the full length of the island (Fig. 4-18). West of the Princess Margaret Arch folding is characteristically tight, whereas east of the arch folding is more open.

On eastern Axel Heiberg Island, the Eureka Sound Formation paraconformably overlies strata ranging in age from late Cretaceous through Triassic and is overlain with angular unconformity by Miocene conglomerates and sandstones of the Beaufort Formation. The Eureka Sound Formation, which ranges in thickness from thin erosional outliers to a maximum of 1,500 m, comprises carbonaceous shales, siltstones, sandstones and thin coals. On easternmost Axel Heiberg Island, at May Point, the Eureka Sound Formation locally conformably overlies the Kanguk Formation (Thorsteinsson, 1972b).

In the May Point area, one coal seam seven meters thick sporadically outcrops along a strike length of 15 kilometers. The rank of this seam is sub-bituminous "B". A 1981 analysis indicated 14%

moisture, 36% volatile matter, 5% ash, 46% fixed carbon, 0.2% sulfur and a calorific value of 23,814 KJ/kg (10,242 BTU) on a moist, mineral matter-free basis.

CURRENT WORK AND RESULTS

The 1982 exploration showed the May Point area to be covered by a relatively thin veneer of Eureka Sound Formation. The lack of outcrop, mainly due to flat, gentle topography and shallowly dipping strata, precluded a detailed geological investigation and attempts to make resource calculations.

However, only the basal part of the formation is preserved along the eastern boundary and most of Petro-Canada Ltd.'s licence was found to lie stratigraphically below the Eureka Sound Formation and has been relinquished. Gulf Canada Resources Ltd. also released their coal licence at May Point.

VESLE FIORD COAL LICENCES

Petro-Canada	Coal
Coal Division	49 E-H
P.O. Box 2844	$78^{0}53'$-$79^{0}23'$N,
Calgary, Alta., T2P 3E3	$82^{0}30'$-85^{0}W

REFERENCES

Thorsteinsson (1972 a-d).

DIAND assessment report 062157.

PROPERTY

Sixteen coal licences: 225-227, 234-239, 248-250 and 282-285.

LOCATION

The coal licences are centered on the northeastern shore of Vesle Fiord, southwestern Ellesmere Island (Fig. 4-15). This area is about 550 km north-northeast of Resolute Bay.

HISTORY

The coal licences were granted by DIAND in July, 1981.

DESCRIPTION

The Eureka Sound Formation is in the order of 2,700 meters thick in the Vesle Fiord area, where four distinct members have been recognized. The basal member consists of 150 m of sandstones of deltaic origin and is gradational with marine shales of the underlying Kanguk Formation. The overlying lower member consists of rhythmically bedded sandstones, siltstones, claystones and coals arranged in fining-upward sequences. This member is between 400 and 600 meters thick and is interpreted as an alluvial plain deposit.

The middle member is lithologically distinct from an underlying dark grey claystone member. This member is characterized by pale yellow, calcareous sandstones, siltstones and limestones. These lithologies collectively comprise 400 to 700 meters of strata north of Vesle Fiord in a prominent syncline (Fig. 4-23). This sequence is partly marine.

The upper member is found south of Vesle Fiord. It is composed of approximately 500 meters of interbedded sandstones, siltstones and lignite. The sandstones range from very fine to medium grained, calcareous to carbonaceous, rippled, cross-bedded and often rooted. Many of the sandstones display characteristics common to fluvial deposition. It contains lignitic coal seams 1 to 4 m thick and has been interpreted as an alluvial plain deposit.

The structures confined to the Eureka Sound Formation in the Vesle Fiord area are composed of several broad synclines north and east of the fiord. South of Vesle Fiord, the Eureka Sound Formation is deformed into a series of parallel folds. The western flank of the area is bounded by a series of extension faults while the eastern boundary is marked, for the most part, by a conformable contact with the Kanguk Formation (Fig. 4-23).

CURRENT WORK AND RESULTS

Reconnaissance of the Vesle Fiord area indicated the presence of several seams exceeding four meters in thickness. Three seams were sampled and proximate analyses were undertaken. The rank of the coal in this area ranges from sub-bituminous "A" (calorific value) near the base of the section to lignite near the top.

The basal and middle members of the Eureka Sound Formation are not coal bearing and the upper member, which contains approximately one-half of the resources, occurs in an area which is structurally deformed. The formation is tightly folded and it appears most of the resources in the upper member are below 200 meters of the surface.

The 4 coal licences, that were retained at the end of 1983, have an inferred resource potential of 4,000 million tonnes.

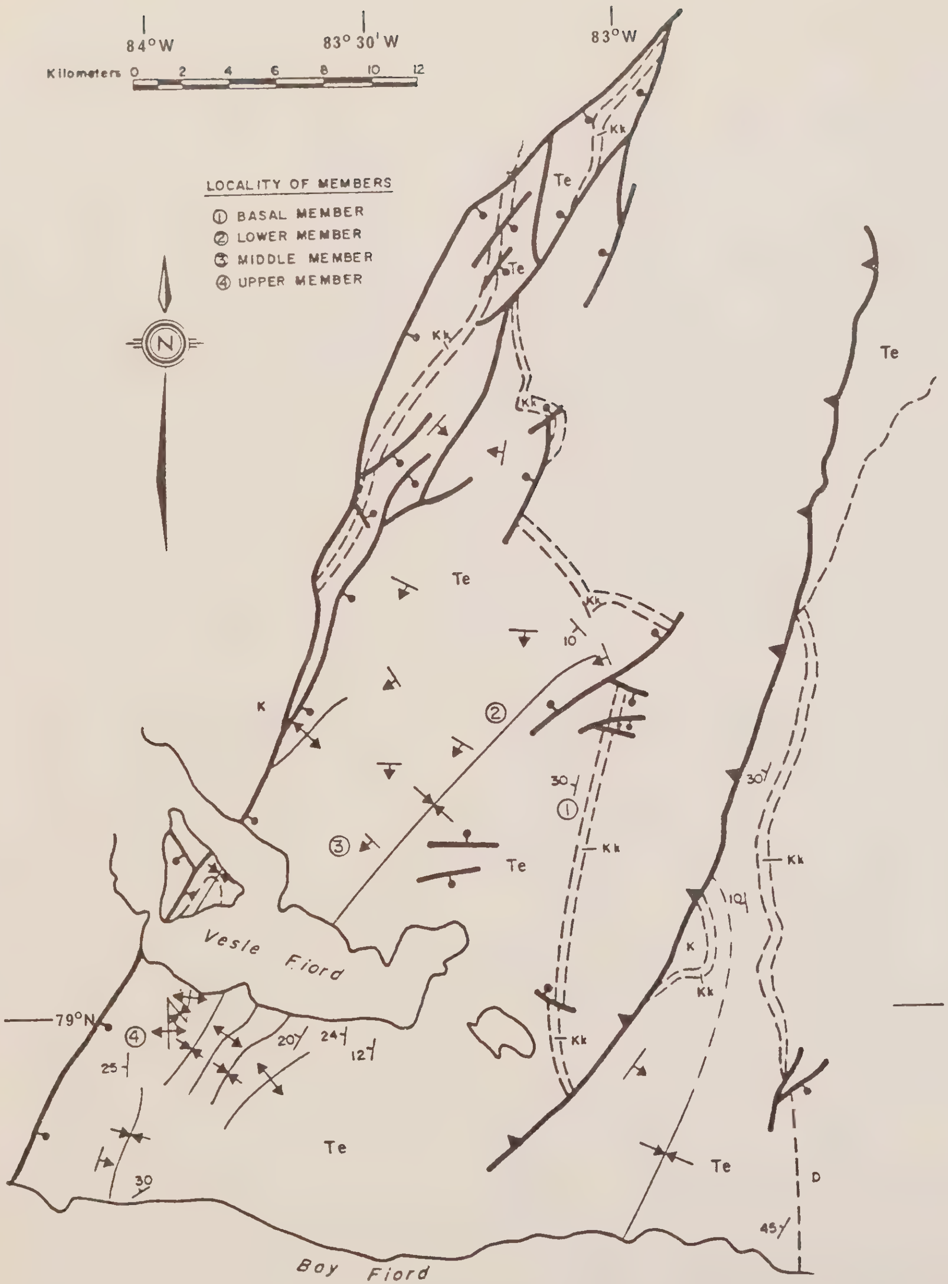

FIGURE 4-23: Schematic geology map of Vesle Fiord area (from DIAND assessment report 062157)

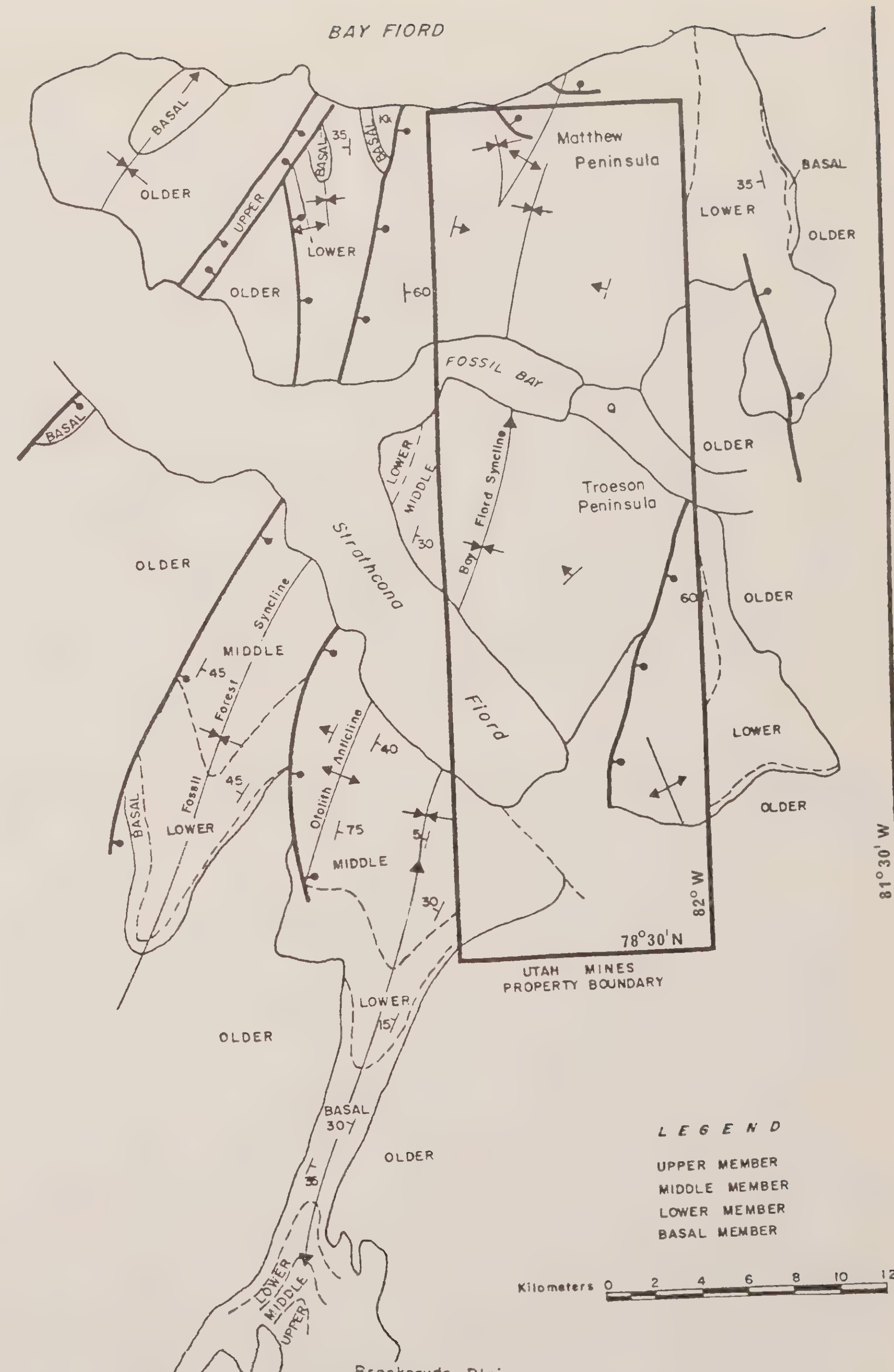

FIGURE 4-24: Schematic geology of the Eureka Sound Formation in Strathcona Fiord area (from DIAND assessment report 062157)

COAL RESOURCE TOTAL - VESLE FIORD AREA

Minimum Seam Thickness	Composite Coal Thickness	Inferred Megatonnes
1 meter	5 meters (lower mbr.)	2,340
1 meter	10 meters (upper mbr.)	1,794

STRATHCONA FIORD COAL LICENCES

Petro-Canada	Coal
Coal Division	49 E/5-7,10-15,F/16
P.O. Box 2844	$78^{0}15'$-$78^{0}52'$N,
Calgary, Alta., T2P 3E3	81^{0}-85^{0}W

REFERENCES

Gibbins (1984); Thorsteinsson (1972c).

DIAND assessment report 062157.

PROPERTY

Twenty-one coal licences: 209-224, 280-281 and 234-237.

LOCATION

The coal licences lie north and south of Strathcona Fiord. The area is bound by Bay Fiord on the north and Braskeruds Plain to the south (Fig. 4-15 and 4-24). The Vesle Fiord and Fosheim Peninsula-East coal licences are immediately north of the Strathcona Fiord licences.

HISTORY

In May,1981, Utah Mines Ltd. obtained seven coal licences in the Strathcona Sound area to protect a large canoe-shaped syncline of coal-rich Eureka Sound Formation (Gibbins, 1984, pp. 117-118). In July,1981, Petro-Canada obtained 110 coal licences in the region including several that completely surround the Utah Mines Ltd. area. Utah Mines Ltd. subsequently relinquished 4 of their coal licences and Petro-Canada applied for and received coal licences 334-337 in May,1982. Considerable coal resources are believed to exist on the three remaining Utah Mines Ltd. coal licences.

Results of Utah Mines Ltd. and Petro-Canada 1981 field work are summarized in Gibbins(1984, p. 117-118 and 122).

DESCRIPTION

Up to 2,500 meters of the Eureka Sound Formation is preserved in a broad syncline that extends from Bay Fiord across Strathcona Fiord to Braskeruds Plain (Fig. 4-24). Here it can be divided into four distinct members: basal, lower, middle and upper, similar to those identifiable in the Vesle Fiord area to the northwest, where only the lower and upper members are coal bearing.

The Strathcona Fiord area comprises a series of parallel folds and faults. The major folds and faults all strike approximately north-northeast. The structures affecting the Eureka Sound Formation are thought to be superimposed on the older Paleozoic structures with concordant strike. The three main folds in the area have locally been referred to as the Bay Fiord Syncline, Otoloth Anticline and Fossil Forest Syncline (Fig. 4-24). The Bay Fiord Syncline, which is the prominent fold in the area, extends south from Bay Fiord to Braskeruds Plain where the fold disappears under a cover of Quaternary deposits. The syncline is a broad, open, cylindrical fold with a wave length of approximately 8 km. The fold is assymetrical with the east limb inclined up to 40^{0} and the west limb up to 75^{0}.

CURRENT WORK AND RESULTS

Samples of seams up to three meters thick were collected from the lower part, while seams up to 24 meters thick were sampled in the upper part of the Eureka Sound Formation.

Bed moisture of coal seams, which ranged from 16 to 28 percent, appeared to be more representative of sub-bituminous coals than lignite. Ash values varied widely, from 5 to 45 percent, and similar to Vesle Fiord the mineral matter appeared to be disseminated rather than in discrete bands. Sulphur content was low - not exceeding 0.75 percent in any of the seams. The volatile content appeared consistent with low rank coals when converted to a dry ash-free basis. The calorific value of the sub-bituminous coals averaged approximately 21,750 KJ/kg on a moist, mineral-matter-free basis while the calorific value of the lignites near the top of the formation averaged 17,500 KJ/kg on a moist mineral-matter-free basis.

Of the fourteen coal seams sampled, all were plotted using bed moisture versus specific volatile index. Of all the samples taken, only two appeared oxidized. The rank, as determined by calorific value, places almost all the samples in the sub-bituminous "C" category.

Selected samples were sent to Cascade Coal Petrography for a complete maceral analysis and reflectance determination. The reflectances recorded from the vitrinite indicated slightly higher ranks to several of the samples. This is probably due to

partial oxidation of the vitrinite giving a slightly attenuated reading. The ranks indicated by the reflectance method ranged from sub-bituminous "A" to lignite. All but two of the nine samples displayed extremely high percentages of mineral matter, but the high percentage of mineral matter indicated from the petrographics was not reflected in the proximate analysis. In fact the petrographic ash was about twice as high as the ash from the proximate analysis. This might be explained in two ways: some of the macerals were misidentified as ash or a large percentage of the mineral matter volatized upon proximate ashing leaving only the inert residue.

Examination of the macerals under ultraviolet light showed some liptinitic material combined with mineral matter that was not visible under normal light. This might explain the seemingly high mineral matter count. However, if the mineral matter count stayed substantially high, it probably indicates part of the mineral matter (calcite) is volatized upon combustion. This could be determined by an analysis of the volatile matter.

Geologic Resources

The Eureka Sound Formation has been divided locally into four informal members in the Strathcona Fiord area. Only the lower and upper members contain continuous seams thicker than one meter. Due to erosion, the upper member, which contains the thickest coal seams, is only preserved on a few of Petro-Canada's licences. The lower member, however, underlies most of Petro-Canada's licences in the area but seams are rarely thicker than a couple of meters. Utah Mines Ltd.'s licences cover most outcrops of the upper member, and the seams on their property have not been included in Petro-Canada Ltd.'s resource calculations in the area.

Several assumptions have been made in order to complete the resource calculations for this area.

RESOURCE TOTAL - STRATHCONA FIORD AREA

Minimum Seam Thickness	Composite Coal Thickness	Inferred Megatonnes
1.0 meter	11 (lower mbr.)	6,013
2.5 meters	6 (lower mbr.)	3,280
1.0 meter	40 (upper mbr.)	840

Petro-Canada has relinquished all of its coal licences in the Strathcona Fiord area.

VENDOM FIORD COAL LICENCES | Coal
Petro-Canada | 49 D/13-15,E/2-4
Coal Division | 77°45-78°15'N,
P.O. Box 2844 | 81°30'-84° W
Calgary, Alta., T2P 3E3

REFERENCES

Okulitch (1982); Thorsteinsson (1972c).
DIAND assessment report 062157.

PROPERTY

Eighteen coal licences:191-208.

LOCATION

The coal licence area is centered about the northern end of Vendom Fiord (Fig. 4-15). The area is about 250 km south of Eureka and 500 km northeast of Resolute Bay.

HISTORY

These coal licences were granted to Petro-Canada by DIAND in July 1981.

DESCRIPTION

South of the Strathcona Fiord area, along Vendom Fiord, several thrust-fault-bounded exposures of Eureka Sound strata are present. Eurekan overthrusting has emplaced Paleozoic strata on top of Late Cretaceous to Eocene clastics of the Eureka Sound Formation. Okulitch (1982) estimated crustal shortening ranges from 25% to 50% in the region. The compressive stress of the Eurekan Orogeny appears to have been directed from the west with the possibility of the thrusting being rooted in the evaporitic horizons of the Ordovician Baumann Fiord Formation, which displays considerable disharmony.

The northern part of the area has been mapped at 1:250,000 scale by Thorsteinsson (1972c).

CURRENT WORK AND RESULTS

Reconnaissance exploration in the 1982 field season showed that the Vendom Fiord area has low economic potential for coal and all the Vendom Fiord coal licences were relinquished in 1983.

STENKUL FIORD COAL LICENCES | Coal
Petro-Canada | 49 C/8,D/5,6
Coal Division | 77°15'-77°30'N,
P.O. Box 2844 | 82°30'-85'W
Calgary, Alta., T2P 3E3

REFERENCES

Fortier and others (1963); Riediger (1985).

DIAND assessment reports 062187, 062157.

PROPERTY

Ten coal licences: 338 to 347.

LOCATION

The coal licences are centered on Stenkul Fiord of southern Ellesmere Island (Fig. 4-15). The area is 400 km northeast of Resolute Bay and 100 km north of Grise Fiord.

HISTORY

Petro-Canada was granted 10 coal licences in the Stenkul Fiord area in August, 1982.

DESCRIPTION

The Eureka Sound Formation is preserved in several graben structures in the Stenkul Fiord area (Fig. 4-25). The formation is at least 165 m thick and overlies the Devonian Okse Bay Formation. This contact is marked by a minor angular unconformity. Multiple, thick coal seams exceeding fifteen meters in thickness are exposed. The seams are flat lying, near surface and range from sub-bituminous "C" to lignite in rank. This area also contains some of the thickest coals in the Arctic and may be the same age (Eocene) as the thick Strathcona Fiord seams.

The Tertiary strata consist of an uncompacted sequence of claystones, sandstones and thick lignite seams ranging from a few centimeters to over fifteen meters in thickness. The sandstones are mainly fine grained, quartzose, and clean; the claystones are carbonaceous. Siliceous tree stumps protrude from some of the seams and are still in an upright growing position.

The Eureka Sound Formation is almost flat lying throughout the area and dips rarely exceed 10^{0}. The formation has formed a relatively thin, extensive mantle along the axes of the Vendom and Schei Synclines. The Eurekan Orogeny has disrupted the continuity of this mantle and has resulted in the formation of several grabens and block-faulted structures throughout the area. Very little coarse sediment was observed in the Eureka Sound Formation

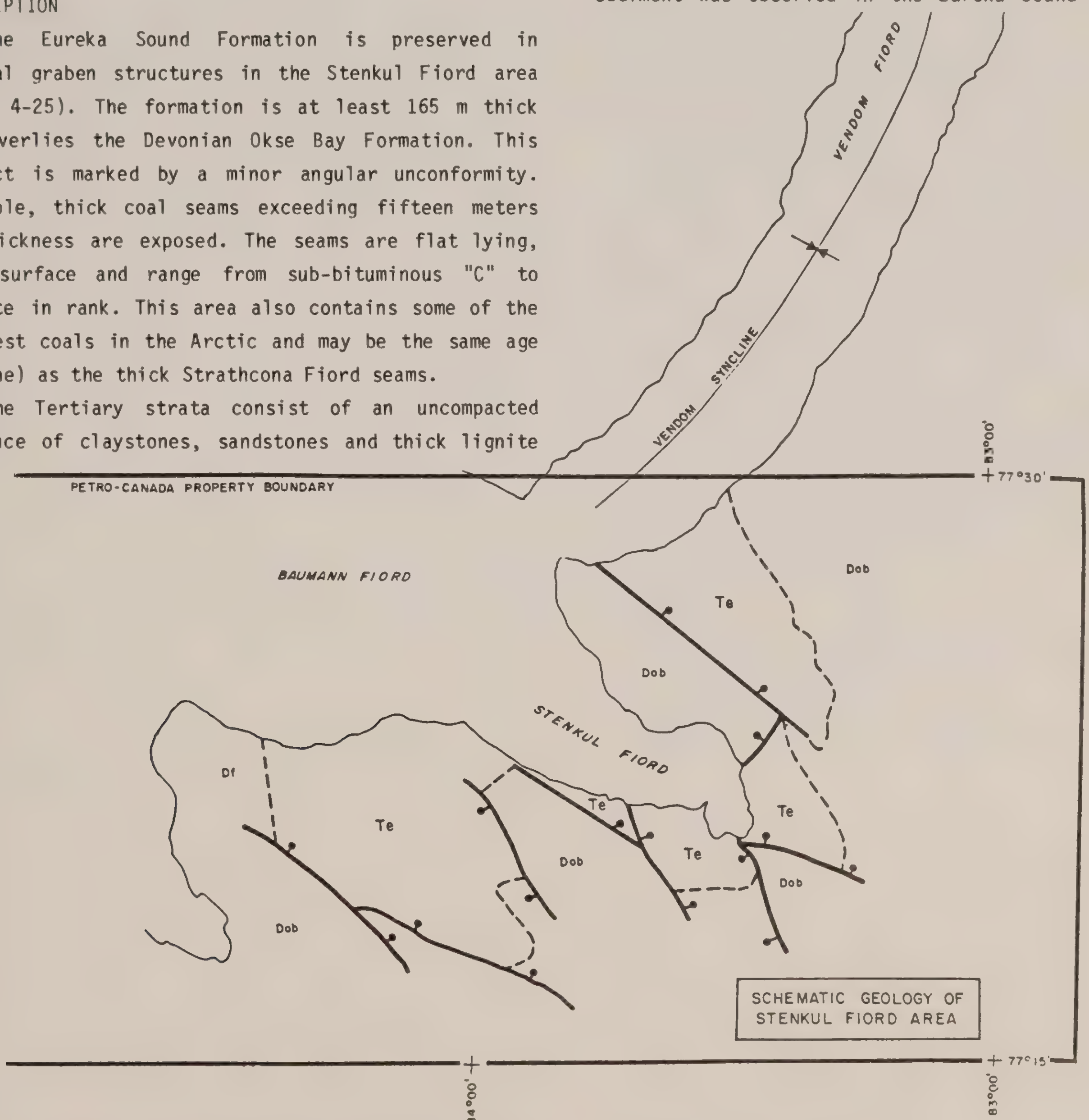

FIGURE 4-25: Schematic geology of Stenkul Fiord area (from DIAND assessment report 062157)

and on this basis it is unlikely the Tertiary strata was deposited while the faults were still active. It has been suggested that the grabens may be related to a major rifting episode south and east of Ellesmere Island. The Eurekan Orogeny has resulted in the area being compressed, uplifted and block-faulted, splitting the coal-bearing strata into separate blocks (Fig. 4-25).

CURRENT WORK AND RESULTS

1982:

During a short reconnaissance of the Stenkul Fiord area a total of seven coal seams were sampled. The individual coal seams ranged from one to over ten meters in thickness. The seams are arranged in multiple layers creating zones up to 25 meters thick. In this area the seams contained visible claystone partings. Ash values ranged from 3 to 20 percent but averaged 12 percent on an as-received basis. Sulphur content was less than 0.5 percent and fixed carbon ranged from 16 to 30 percent on an as received basis. The calorific value varied from 16,000 to 20,000 KJ/kg on a moist, mineral-matter-free basis. The proximate analysis indicates a rank of sub-bituminous "C" to lignite for the seams in this area. An average proximate analysis was produced for the eight seams and has been compared to an Estevan lignite.

As Received	Stenkul Fiord	Estevan Lignite
Moisture	27.90	28.50
Ash	11.90	11.40
Volatile Matter	28.60	27.40
Fixed Carbon	31.60	32.70
Sulphur	0.29	0.50
Calorific Value (KJ/kg)	17,000	16,500
(BTU)	7,311	7,096

The vitrinite reflectances indicated all the samples were lignite in rank. The maceral analysis of the seams was similar to the coals of Strathcona Fiord. Vitrinite comprises about 30 to 40 percent of the samples. The samples were relatively rich in exinitic materials, i.e., spores and resins. Again the petrographic ash was high as compared to the ash calculated from the proximate analysis. Either some macerals were misidentified as ash or some of the minerals volatize during combustion. The latter, however, should show up in higher than expected volatile contents. This was not seen in the proximate analyses.

1983:

The 1983 field program consisted of detailed mapping, measuring and sampling stratigraphic sections of coal beds and the enclosing Eureka Sound Formation. Much of this work is the basis of a MSc thesis by Riediger (1985).

The 1983 work confirmed the existence of thick coal seams (up to 10 m thick) and considerable coal resources in the area.

CARVINGSTONE IN THE ARCTIC ISLANDS

Carvingstone is one of three mineral commodities presently being mined in the Canadian Arctic. Its value is greatly enhanced by value added during local secondary processing, i.e., carving. The economic importance of these activities to the northern and national economies is indicated by payments estimated at 10 million dollars, shared among some 2,000 Inuit carvers in 1981. Transportation, wholesaling and marketing costs add an equal or greater value to the final retail value of goods and services. The cash value of these carvings to the Inuit of the Eastern Arctic was exceeded only by Government wages and transfer payments. Carving is in many instances an alternate to unemployment and a source of readily available cash income.

The 1982 economic recession had a devastating effect on the sale and production of Inuit carvings and prints. New initiatives are required to cut costs, improve quality, reduce inventories, and promote an interest and appreciation of Inuit sculptures, if this valuable sector of the Northern economy is to continue to contribute to the welfare and culture of the country (Gibbins, in prep.).

The Resident Geologist's office of the Department of Indian Affairs and Northern Development has been asked from time to time to assist in the exploration and assessment of potential carvingstone. In 1975, DIAND's Geology Section sponsored a report on carvingstone occurrences in Southern Baffin Island (Hogarth, 1975).

In 1981, the Arctic Islands District Geologist was asked to help find new sources of carvingstone in the Cumberland Peninsula area, near the communities of Pangnirtung and Broughton Island. No new sources were located in this area, although several

prospective ultramafic and marble outcrops were examined.

Subsequently, the Arctic Islands District Geologist was asked to examine the Mary River-Nuluujaak Mountain area, where some carvingstone was being quarried. During his visit, Phillip Pitseolak, an Inuit carver from Pond Inlet, discovered a new source of excellent quality carvingstone, while prospecting an area of ultrabasic rocks which is shown on Geological Survey of Canada Map 1451A-Icebound Lake (Jackson and others, 1978). The importance of this discovery is demonstrated by the fact that almost all of the carvings currently being created in Pond Inlet, Clyde River and Igloolik are made from rock which came from this site.

Also in 1981, Dr. William Padgham of DIAND and Dr. Rollie Ridler, formerly of Newmont Mining Ltd. discovered and reported carvable soapstone deposits at Baton Lake (200 km north of Yellowknife).

As any resident of the Northwest Territories has the right to 50 tons of stone for his personal use, there is no point to staking and recording mineral claims for carvingstone.

HOARE BAY RECONNAISSANCE

Carvingstone
16 E west half
$65-66^{o}N, 63^{o}-64^{o}W$

REFERENCES

Boas (1885); Jackson (1971); Jackson and Taylor (1972).

LOCATION

The area includes the southeast coast of the Cumberland Peninsula of southeastern Baffin Island (D in Figure 4-1).

HISTORY

Boas (1885) discussed the importance and sources of 'soapstone' in the Cumberland Sound area in general terms.

DESCRIPTION

"Most of the southern half of Cumberland Peninsula is underlain by a thick succession of intensely deformed, layered, metasedimentary rocks and intermediate to basic metavolcanic rocks, possibly of Aphebian age and referred to as the Hoare Bay Group (Jackson 1971). These rocks have been metamorphosed to amphibolite facies and the main lithologies are mica-hornblende-feldspar-quartz schist and gneiss, amphibolite, and biotite-hornblende schist and gneiss. The metavolcanic rocks have pillows and pyroclastic textures preserved locally and have serpentinized ultrabasic intrusions associated with them. Small amounts of oxide and oxide-silicate iron formation, quartzite, and metachert are also present. Minor marble, calc-silicate rocks, and rusty schist outcrop along the northwest margin of the group" (Jackson and Taylor, 1972, p. 1,665).

CURRENT WORK AND RESULTS

In 1982, a number of ultrabasic outcrops, not visited in 1981, were examined for carvingstone potential. Localities for investigation were provided by Dr. G.D. Jackson of the Geological Survey of Canada from unpublished maps. Unfortunately, the only carvable material found was a very small area of talcose rock related to alteration along joint surfaces.

ICEBOUND LAKE RECONNAISSANCE

Carvingstone
37 G south half
$71^{o}-71^{o}30'N, 76^{o}-80^{o}W$

REFERENCES

Gibbins (in prep.); Jackson and others (1978).

LOCATION

The southern half of NTS area 37 G is part of northern Baffin Island. It is about 170 km south of Pond Inlet and 120 km south-southeast of the head of Milne Inlet. There is an abandoned, but serviceable airstrip at Mary River in the western part of the area (C in Figure 4-1).

HISTORY

An excellent source of good quality carvingstone (altered ultrabasic rock) was discovered a few kilometers southeast of the Mary River iron deposits by Phillip Petseolak in 1981 (See introduction and Gibbins, in prep.).

DESCRIPTION

The area is mainly underlain by Archean and/or Aphebian gneisses and granitoids. Metasediments and metavolcanics of the Archean Mary River Group, which includes important areas of iron formation and ultrabasics, are prominent in many parts of the area (Jackson and others, 1978).

Lower Paleozoic carbonates cover much of the southwest corner of the area, southwest of the Central Borden Fault Zone. Large areas of unconsolidated glacial drift are common and a small

percentage of the area is covered by permanent icefields.

CURRENT WORK AND RESULTS

In 1982, DIAND's Arctic Islands District Geologist spent one day examining areas of ultrabasics east and west of Mary River. Most of the areas of ultrabasic rocks shown on Geological Survey of Canada Map 1451A (Jackson and others, 1978) were briefly examined, but hydrothermal alteration, necessary to produce carvingstone like at the Pitseolak site, was not observed.

FLEXURE BAY

Carvingstone
68 A/9
72°32'N,96°25'W

REFERENCES

Christie (1971); Blackadar (1967).

LOCATION

The area of interest is just south of Flexure Bay on the east coast of Prince of Wales Island. It is about 250 km south of Resolute Bay and 50 km west-southwest of the southwest corner of Stanwell Fletcher Lake (B in Figure 4-1).

HISTORY

There is no known record of stone from the Flexure Bay area being used to produce carvings or utensils.

In the spring of 1982, Paul Qayutinnuaq of Yellowknife produced a small carving from a sample of rock collected by geologists of Monopros Ltd.

DESCRIPTION

A circular area 3 km in diameter, just south of Flexure Bay, is shown as unit 4 - ultrabasic rocks on GSC Map 3-1967 (GSC Bull. 151, Blackadar, 1967). A more recent map (GSC Open File 66, Christie, 1971) shows no evidence of ultramafic rocks in this area.

CURRENT WORK AND RESULTS

In 1983, the area was examined by the Arctic Islands District Geologist and Levi Nunqaq, an Inuk carver from Resolute Bay. Field observations showed that all of the outcrop in the area mapped as unit 4 is granitic gneiss with some altered mafic lenses and locally abundant green to dark-green chlorite and epidote. However, a few small pieces (less than 25 cm diameter) of altered ultramafic rock were found in the banks of two westerly-flowing creeks near the western boundary of the area shown as unit 4, and several smaller pieces (less than 10 cm diameter) were found at a few locales along a prominent ridge that marks the western limit of 'unit 4' outcrop. The softness of the boulders and their limited distribution precludes long-distance glacial or fluvial transport. These soapstone boulders seem to have a relatively high talc and chlorite content with minor serpentine. The rock is fairly soft and easily carved, it takes a mediocre to fair polish and is black to dark-green or grey in colour. The site has fairly good accessibility, but the limited quantity of large pieces, coupled with the low demand for stone in the nearest community, Resolute Bay, indicates that this locale has minor economic significance.

SAVAGE POINT

Carvingstone
16 A/9,16
72°45'N,96°33'W

REFERENCES

Christie (1971); Blackadar (1967).

LOCATION

Savage Point is on the northern tip of a small, but prominent peninsula about mid-way along the east coast of Prince of Wales Island. It is about 225 km south of Resolute Bay and 50 km west of Stanwell Fletcher Lake.

HISTORY

Local Inuit report that a nearby site, exposed only at low tide, has provided stone for stone lamps (personal communication).

DESCRIPTION

Savage Point is characterized by steep cliffs along its north and east shore. These are due to a thick diabase sill that caps most of the peninsula.

CURRENT WORK AND RESULTS

A brief visit to the Savage Point area confirmed the mapping of Christie (1971), i.e., a thick diabase sill capping Helikian red shale, conglomerate-sandstone and stromatolitic dolomite (rather than the basement gneisses shown on GSC Map 3-1967)(Blackadar, 1967). Many small pieces (less than 3X10X10 cm) of bright yellow-green serpentinite presumably formed by the metamorphism of dolomites by the diabase sill were observed amongst the beach pebbles. Recent and Quaternary beach deposits or large blocks of talus cover most of the base of the steep diabase cliffs,

making it difficult and potentially dangerous to prospect or quarry the most favourable zone.

It was impossible to examine the intertidal area during my visit, as the area was still covered with sea ice.

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CHAPTER 5: KEEWATIN REGION

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INTRODUCTION

In 1982 and 1983, the District Geologist, Keewatin Region, monitored mineral exploration in the mainland part of the Northwest Territories east of 102°W longitude. The Keewatin Region is part of the Churchill Structural Province of the Canadian Shield. It is underlain by Archean and Aphebian volcanic, sedimentary and plutonic rocks deformed and metamorphosed during the Hudsonian Orogeny. Shallow-dipping to flat-lying, unmetamorphosed to slightly metamorphosed rocks of late Aphebian and Helikian age locally overlie the metamorphic complex south and west of Baker Lake (Fig. 5-1).

In this report, the Keewatin Region has been subdivided into three main areas on the basis of geology and exploration targets (Fig. 5-1): the Ennadai Lake-Rankin Inlet area, the Baker Lake-Thelon River area and the Chantrey Inlet-Wager Bay area. Most of the properties in the region encompass, or are adjacent to, lakes on which fixed-wing aircraft can land.

CARIBOU PROTECTION MEASURES

The 1982 Caribou Protection Measures, appended to the land use permits issued in the Keewatin, were essentially the same as the 1981 measures (Laporte, 1984). Holders of land-use permits were forbidden to operate within the Caribou Protection Areas (Fig. 5-2) between May 15 and July 31. However, operations begun before May 15 could be continued, upon approval by the Land Use Inspector, as long as caribou cows were not approaching the area of operation. If cows approached the area of operation, the permittee was to suspend operations and evacuate all personnel except those required for maintenance and protection of the camp facilities. Also, the Land Use Inspector could allow operators to occupy, before July 31, those parts of the Caribou Protection Areas that the caribou cows and calves were not expected to use.

If calving occurred outside the Caribou Protection Areas, permittees were to suspend operations in the areas occupied by cows and calves between May 15 and June 30. Permittees also had to suspend airborne geophysical surveys and the slinging of fuel or equipment by helicopter in the vicinity of cow-calf aggregations.

Permittees were forbidden to locate operations and to conduct activities, such as airborne surveys and the movement of equipment, which would interfere with migrating cows. Between May 15 and September 1, permittees could not diamond drill within 5 km of any Designated Crossing and could not construct a camp, cache fuel or conduct any blasting within 10 km of any Designated Crossing.

After public review of the Caribou Protection Measures in early 1983, the protection area boundaries and the timing of the measures were altered (Fig. 5-2). Operations were to be suspended within the protection area between May 15 and July 15 instead of between May 15 and July 31. Operations outside the protection area but in areas occupied by cows and calves were to be suspended between May 15 and July 15 instead of between May 15 and June 30. Blasting and the operation of all-terrain vehicles were added to the activities to be suspended in the vicinity of cow-calf aggregations.

ENNADAI LAKE-RANKIN INLET AREA

In this area, a complex of granitic gneisses, migmatites and intrusions enclose northeast-trending belts of Archean volcanic flows and pyroclastics, slate, greywacke, conglomerate and minor iron-formation. These Archean rocks are unconformably overlain by Aphebian conglomerate, greywacke, quartzite, orthoquartzite, argillite and dolomite which, to the east, are interbedded with and overlain by basaltic flows. During the Hudsonian Orogeny, the Aphebian and Archean rocks were folded about northeasterly axes and intruded by quartz monzonite and granodiorite. Fluorite-bearing granite intruded the Archean-Aphebian complex during the Paleohelikian.

Volcanogenic massive sulphide and precious metal deposits within the Archean volcano-sedimentary assemblage are the main targets of mineral exploration in this area.

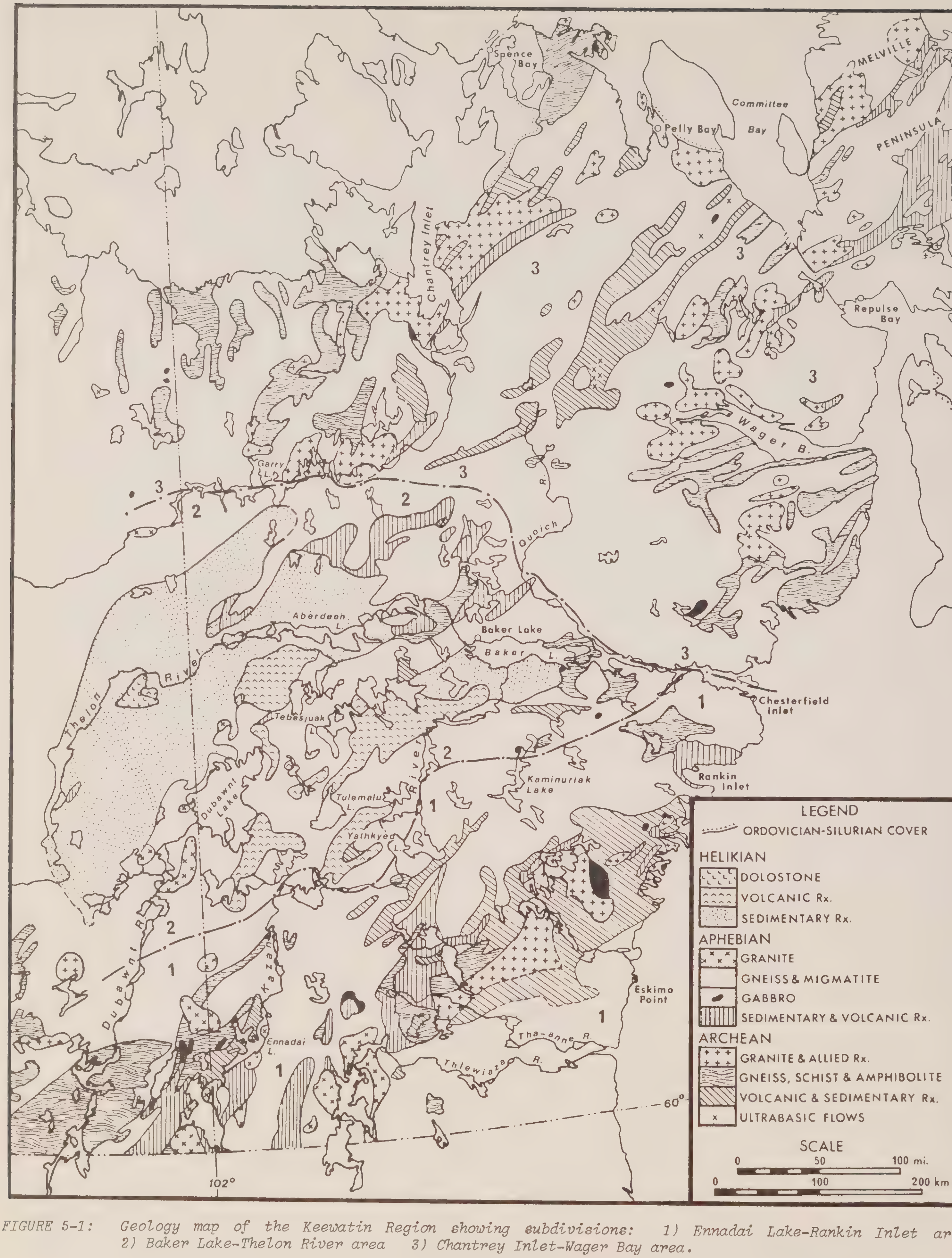


FIGURE 5-1: Geology map of the Keewatin Region showing subdivisions: 1) Ennadai Lake-Rankin Inlet area 2) Baker Lake-Thelon River area 3) Chantrey Inlet-Wager Bay area.

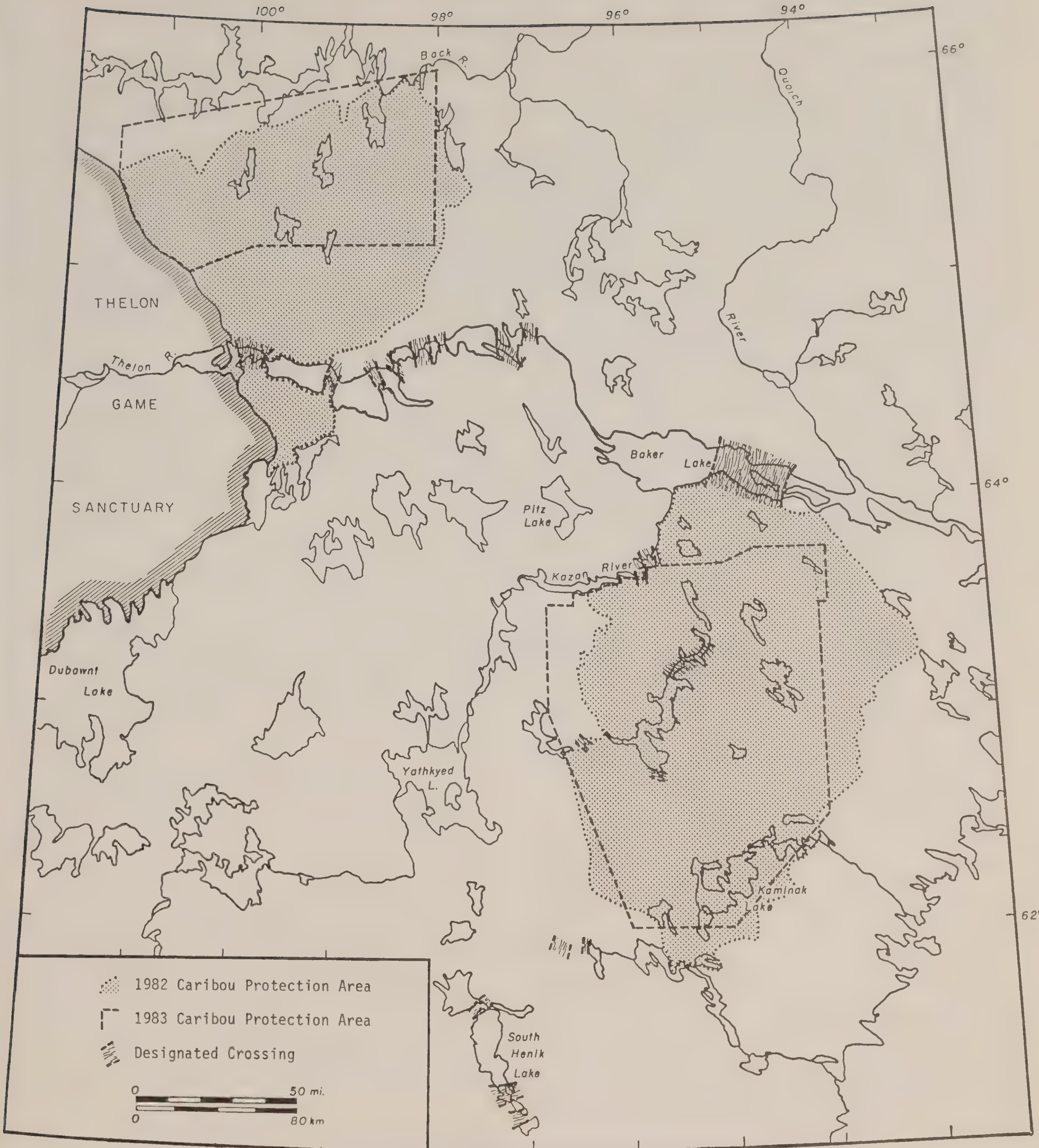


FIGURE 5-2: Extent of areas affected by the Caribou Protection Measures in 1982 and 1983.

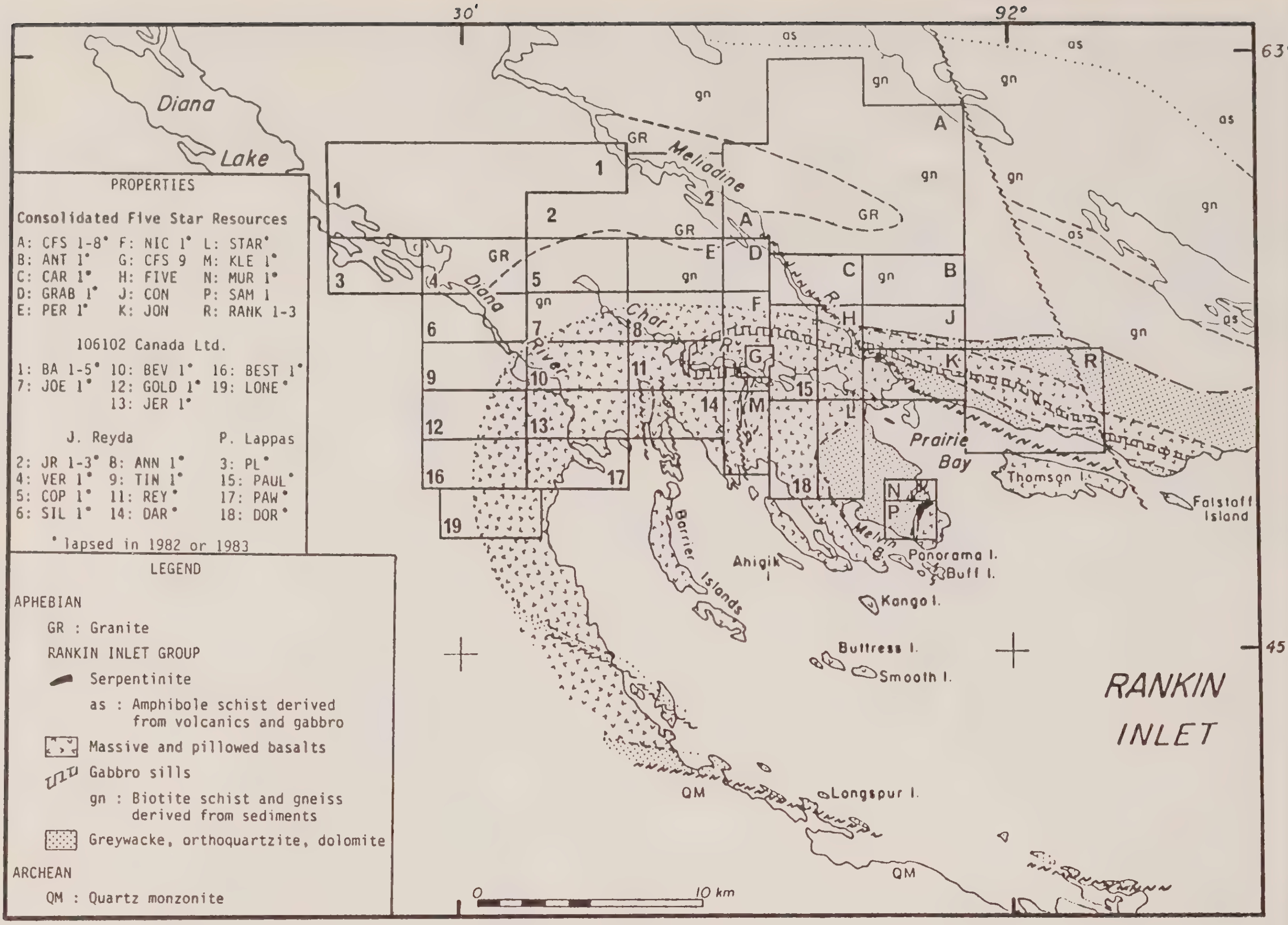


FIGURE 5-3: Geology and claims, Rankin Inlet area (geology from Laporte, 1983b).

RANKIN INLET CLAIMS

Consolidated Five Star Resources Ltd.	Copper,Nickel
10250 - 101 St.	55 J/13; K/16
Edmonton, Alta., T5J 3P4	

REFERENCES

Heywood (1973); Laporte (1974a, b, 1983b, 1984). DIAND assessment report: 081583.

PROPERTY

The properties staked in the Rankin Inlet area are listed in Figure 5-3.

LOCATION

The claims cover the north shore of Rankin Inlet (Fig. 5-3).

HISTORY

A copper-nickel deposit on the south shore of Prairie Bay was discovered in 1928 and mined by North Rankin Nickel Mines Ltd. from 1957 to 1962. The company extracted 9,660 tonnes of nickel and 2,630 tonnes of copper from the 368,093 tonnes of ore mined.

From 1969 to 1972, the Rankin Nickel Syndicate explored the area with airborne and ground geophysical surveys, geological mapping and diamond drilling of conductors but failed to outline metal concentrations of interest (Laporte, 1974a, b).

Most of the claims listed in Figure 5-3 were staked in late 1980 and early 1981. The RANK claims were added to the property in early 1982 and all but the CAR, CON, FIVE, JON, RANK and SAM claims lapsed in late 1982 and early 1983. Prospecting and sampling of the gabbro sill north of Prairie Bay indicated it could possibly host disseminated copper-nickel deposits (Laporte, 1984).

DESCRIPTION

The area is underlain by rocks of the Aphebian Rankin Inlet Group (Laporte, 1983b). The group consists of greywacke with minor conglomeratic greywacke, quartzite and dolomite overlain by massive

and pillowed basaltic flows. Gabbro sills intrude the sediments near the base of the volcanic sequence and three serpentinite sills, one of which hosted the North Rankin Nickel Mines Ltd. orebody, outcrop at the base of the volcanic pile. The sediments are in fault contact with quartz monzonite along the south shore of the inlet and are intruded by a granite pluton to the northwest.

Two periods of folding affected the Rankin Inlet Group rocks. First-generation recumbent isoclinal folds with northwest-trending axial planes formed through gravitational sliding. Second-generation folds are symmetrically disposed about the axis of the granitic intrusion and have east-southeast-trending and near-vertical axial planes. Metasomatic alteration accompanied the intrusion of both the granitic rocks and serpentinite.

CURRENT WORK AND RESULTS

Mapping and sampling of the eastern extension of the gabbro sill north of Prairie Bay in 1982 confirmed its potential to host copper-nickel deposits.

BANNOCK LAKE SHOWING

Silver Chief Minerals Ltd.	Gold
1570, 340 - 12th Ave., SW	55 K/6
Calgary, Alta., T2R 1L5	$62^{\circ}23'$N,$93^{\circ}18'$W

REFERENCES

Heywood (1973); Laporte (1974a, b, 1976).

DIAND assessment reports: 017084, 080448, 081688.

PROPERTY

JA 1-2 and SC 1-2 — 55 K/6

LOCATION

The property extends east from the east shore of Maze Lake to north of Whiterock Lake (Fig. 5-4).

HISTORY

Gold was discovered in the Bannock Lake area by prospectors R. Maloney and P. McLeod in 1961 while exploring Prospecting Permit 17 held by North Rankin Nickel Mines Ltd. The area was reportedly staked in 1938 by E. Connolly but no record of this staking remains.

Prospecting Permit 17 was relinquished in 1962 and the area was acquired as Prospecting Permit 202 by Husky Oil Ltd in 1970 (Laporte, 1974a, b). One sample was collected in the vicinity of the Bannock Lake Showing during the prospecting of anomalies detected by airborne surveys but contained no gold. The permit expired in April, 1973.

The area was staked as the DEB 1-5 and EVE 1-6 claims by R. Kasner and E. Bazinet for D. Hurd in June, 1973. A number of trenches were blasted in the showing at that time (Laporte, 1976). The last of the DEB and EVE claims lapsed in 1977.

Claims JA 1-2 and SC 1-2 were staked for Silver Chief Minerals Ltd. in March, 1981. The JA claims lapsed in 1983.

DESCRIPTION

The claims cover the northeastern end of a synclinorium of Hurwitz Group Kinga Formation orthoquartzite and the overlying Ameto Formation slate, mudstone and volcanics. These rocks are underlain to the northwest and northeast by Archean mafic volcanics of the Kaminak Group. Metasediments of the Kaminak Group outcrop at the contact between the Archean volcanics and Aphebian orthoquartzite south of Bannock Lake and at the contact between the volcanics and intrusive Archean quartz diorite to granodiorite to the east.

The Kaminak Group metasediments south of Bannock Lake are impure quartzite and grit which grade into conglomerate containing well-rounded granitic boulders up to 76 cm in diameter. The northeast-trending sediments are cut by north-northwest-trending faults, and to the east, are in fault contact with basaltic flows and diorite.

Two gold-bearing zones were outlined in 1961. In Zone 1, a discontinuous quartz vein up to 1.5-m-thick dips 60°E in a poorly developed shear zone in conglomerate. Zone 2, 800 m to the southeast, is a rusty-weathering shear zone trending 60° in conglomerate, basalt and diorite. A 1.5-m-wide quartz vein dipping 80°E in the shear zone contains gold and, locally, concentrations of sulphides. Samples from the Bannock Lake Showing collected in 1961 contained 132 and 6.5 ppm Au. Grab samples collected from trenches by D. Hurd in 1973 contained tr. to 57 ppm Au. Visible gold was removed from 6 of the 20 samples collected in 1973 before assaying.

CURRENT WORK AND RESULTS

The claims were prospected in 1982. Quartz and quartz-carbonate veins were sampled and found to contain up to 4.2 ppm Au over 1.5 m.

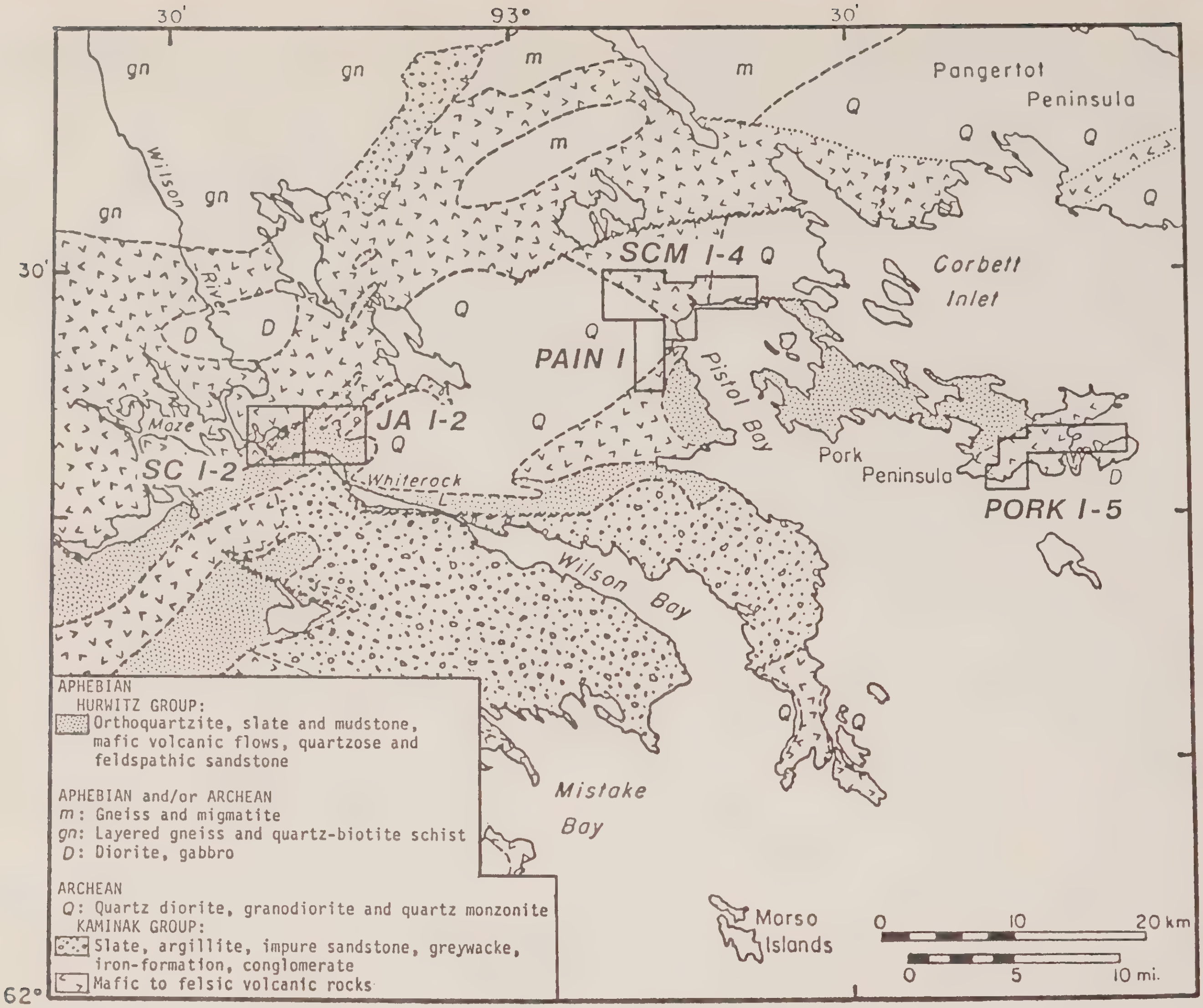


FIGURE 5-4: Geology and claims, Pistol Bay-Maze Lake area (Geology from Heywood, 1973).

PISTOL BAY CLAIMS

Silver Chief Minerals Ltd.	Gold, Copper
1570, 340 - 12th Ave., SW	55 K/7,10
Calgary, Alta., T2R 1L5	$62^{\circ}28'N, 92^{\circ}45'W$

REFERENCES

Heywood (1973), Laporte (1974a, b).

DIAND assessment reports: 017084, 019508, 019834, 081688.

PROPERTY

PAIN 1 and SCM 1-4 55 K/7,10

LOCATION

The claims extend northwest from Pistol Bay on the west shore of Hudson Bay (Fig. 5-4).

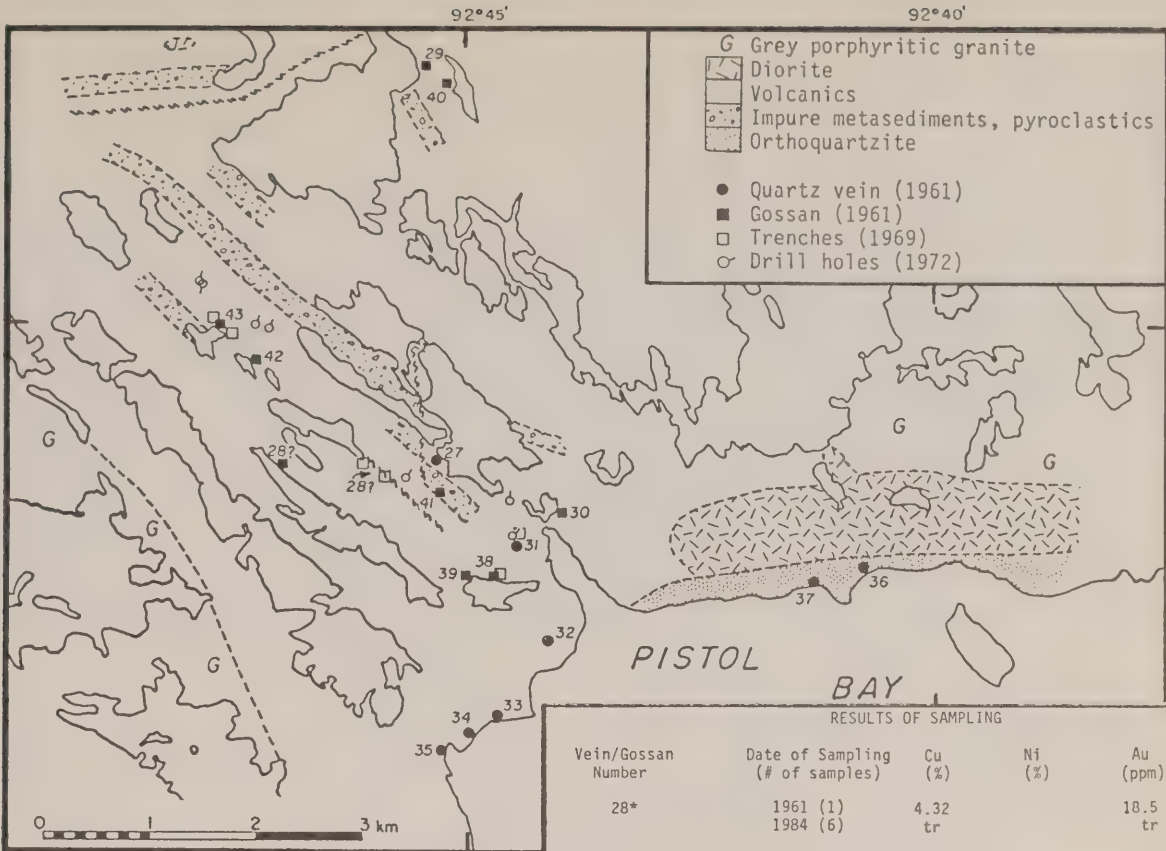
HISTORY

North Rankin Nickel Mines Ltd held area 55 K/7 as Prospecting Permit 18 from April, 1961 to April, 1963. Prospecting in 1961 outlined a number of arsenopyrite concentrations, gossan zones and quartz veins which were trenched and sampled (Fig. 5-5). Twenty-five claims were staked in the area by the company.

The area was restaked as the MAR claims in 1969 for Maroubra Holdings Ltd and Whale Cove Copper Mines Ltd. Trenching and sampling of gossan zones was done in 1969 and 1970 (Laporte, 1974a). Five Star Petroleum and Mines Ltd acquired some of the MAR claims in 1971 and added the BEST, BM, CAP, FAR, JER and ORE claims to the property in 1971 and 1972.

A ground EM survey was done in 1971 and a magnetic survey in 1972. Eight holes totalling 301.4 m were drilled to probe 4 conductors and 1 showing in 1972. Four holes totalling 106 m and 6 trenches were blasted to investigate gossan zones on the JER claims and 3 holes totalling 32 m were drilled on the FAR claims in 1972 (Laporte, 1974b).

Claims PAIN 1 and SCM 1-4 were staked for Silver



RESULTS OF SAMPLING

Vein/Gossan Number	Date of Sampling (# of samples)	Cu (%)	Ni (%)	Au (ppm)	Ag (ppm)
28*	1961 (1)	4.32		18.5	
	1984 (6)	tr		tr	
31	1961 (1)			1.7	
trench #8	1969 (4)	1.68-3.84	0.11-1.23	tr-16.4	25.3-61.6
	1971 (1)	2.89	0.11		
	1984 (2)	2.00,5.90	0.01,0.08	tr, 0.4	
trench #9	1971 (1)	1.65	0.15		
33	1961 (1)			2.4	
34	1961 (2)			19.2,39.7	
	1969 (3)	0.02-0.07	0.02-0.09	3.4-44.5	13.0-54.7
	(1)	0.68			
	1984 (1)	tr	0.11	20.6	
38 C Mtn #1	1969 (3)	0.07-0.21	tr-0.08		
C Mtn #2	1969 (3)	0.09-1.85	0.04-0.09	tr-10.6	28.0-36.6
	1971 (1)	0.80	0.005		
	1984 (2)	0.02,0.08	0.01	tr	
MAR 79 trench #4	1971 (1)	0.48	0.08		
	1984 (3)	0.13-0.16	0.02	tr	1.71
trench #5	1969 (3)	0.90-1.48	0.04-0.09		
trench #6,7	1969 (3)	0.17-0.68	0.04-0.12		

* Gossan #28 was probably misplotted on the 1961 map, no gossan was found trenched at that location in 1984. The gossan sampled in 1961 is probably the one on claim MAR 79.

FIGURE 5-5: Mineral occurrences, Pistol Bay area (Geology from Assessment Report 017084).

Chief Minerals Ltd. in March, 1981 and all but SCM 2 lapsed in 1983.

DESCRIPTION

A 6- to 11-km-wide belt of Archean Kaminak Group mafic volcanic rocks intruded to the east and west by quartz diorite to granodiorite extends north from Pistol Bay. Six km north of the bay, an east-trending fault separates the volcanic belt and adjacent plutons to the south from a much more extensive sequence of north-trending volcanics (Fig. 5-4). Orthoquartzite of the Hurwitz Group Kinga Formation is in fault contact with the volcanics and intrusions along the north shore of Pistol Bay.

The two prospectors who explored the area in 1961 sampled 17 gossans and quartz veins (no. 27 to 43 in Fig. 5-5). Trenching in 1969 explored gossan zones on claims MAR 79 (gossan 28?), MAR 95 (gossan 43) and MAR 15 and 16 (gossan 38/C Mtn Zone) and two quartz veins on claims MAR 15 (vein 31) and MAR 43 (vein 34). Field work by the author in 1984 indicates that the prospectors active in 1961 consistently misidentified pyrrhotite as arsenopyrite.

The holes drilled on EM anomalies in 1972 encountered disseminated pyrite, pyrrhotite and chalcopyrite in metavolcanics. Metal content was generally less than 0.1% Cu and 0.05% Ni with the best result being 0.48% Cu over 0.61 m. The hole drilled under trench 9 on claim MAR 15 intersected 4 quartz veins 1.5 to 2-m-wide in metavolcanics. One of the quartz veins encloses a 15-cm-wide band of 40% pyrrhotite and minor chalcopyrite and contained 0.18% Ni, 0.09% Cu and 6 ppm Ag over 0.61 m.

CURRENT WORK AND RESULTS

The zones explored in 1970 were prospected by K.G. Rose in 1982. The C Mtn Showing is described as a 305- to 400-m-long rusty zone commonly less than

0.6 m but up to 3-m-wide. The zone is in volcanics and resembles banded sediments. A second rusty zone in volcanics outcrops at the west end of the lake. No samples were collected from either of these zones as no sulphides were recognized.

Quartz vein 31 explored in 1970 with trenches 8, 9 and 10 extends at most 450 m and consists of white quartz and carbonate containing patches of iron sulphides. Samples collected from the trenches in 1982 contained trace to 9 ppm Au, trace to 3 ppm Ag, trace to 0.46% Cu and trace to 0.06% Ni.

Samples were also collected from a discontinuous quartz-carbonate vein in a shear zone in the volcanics 200 to 300 m northwest of Pistol Bay (vein 32?). The quartz and carbonate occur as patches up to 3 m wide and 30 m long. One grab sample of pyrite-bearing quartz in a 1.5-m-wide quartz-carbonate vein contained 2 ppm Au.

PORK PENINSULA PROJECT

Canadian Nickel Co. Ltd.	Gold
Copper Cliff, Ont.	55 K/8
POM 1NO	62°23'N,92°12'W

REFERENCES

Heywood (1973).

DIAND assessment report: 081670.

PROPERTY

PORK 1-5 55 K/8

LOCATION

The claims extend east across the eastern end of Pork Peninsula (Fig. 5-4).

HISTORY

Claims PORK 1 to 3 were staked in 1981 to cover a previously trenched but unreported gold showing on the west side of Pork Peninsula and a pyrite-pyrrhotite-chalcopyrite showing indicated on the published geological map of the Tavani area (Heywood, 1973). Samples collected from the trenches in 1981 contained 3.43 ppm Au over 6.09 m, 2.74 ppm Au over 8.84 m and 3.77 ppm Au over 7.82 m. PORK 4 was added to the property in 1982. PORK 5 was added to the property and PORK 3 lapsed in 1983.

DESCRIPTION

Pork Peninsula consists of a north-facing pile of Archean Kaminak Group pillow basalts and subvolcanic gabbro sills intruded to the southeast by a sheeted dyke complex of diorite and gabbro. The volcanics are overlain, in the northwestern part of the peninsula by orthoquartzite of the Aphebian Hurwitz Group Kinga Formation.

CURRENT WORK AND RESULTS

Geological mapping of the volcanics in 1982 and 1983 outlined a number of minor interflow tuffaceous and exhalative layers 1 to 2 m wide and 10 m to 1 km long and one major layer 25 to 50 m wide extending 7.0 km across the peninsula. The tuffaceous/exhalative bands are foliated sericitic and chloritic schistose zones enclosing chert, iron-formation and quartz-carbonate vein-like aggregations. Concordant to sub-concordant feldspar-porphyry sills intrude the main tuffaceous band and the adjacent volcanic flows. Gold is associated with pyrite-rich parts of the banded oxide iron-formation and pyrite-pyrrhotite concentrations in the quartz-carbonate aggregations. Samples of the main zone contain up to 7.58 ppm Au over 4.5 m.

VLF and vertical-loop EM surveys outlined one EM conductor associated with the trenched showing and a number of VLF conductors associated with shear zones.

HURWITZ PROJECT

Suncor Inc.	Gold, Uranium
500 - 4th Ave., SW	65 B/15,16; G/1-3, 6-8
Calgary, Alta., T2P 2V5	61°10'N,98°30'W

REFERENCES

Eade (1973, 1974); Eade and Chandler (1975); Laporte (1984).

DIAND assessment reports: 081660, 081708, 081709, 081720, 081761.

PROPERTY

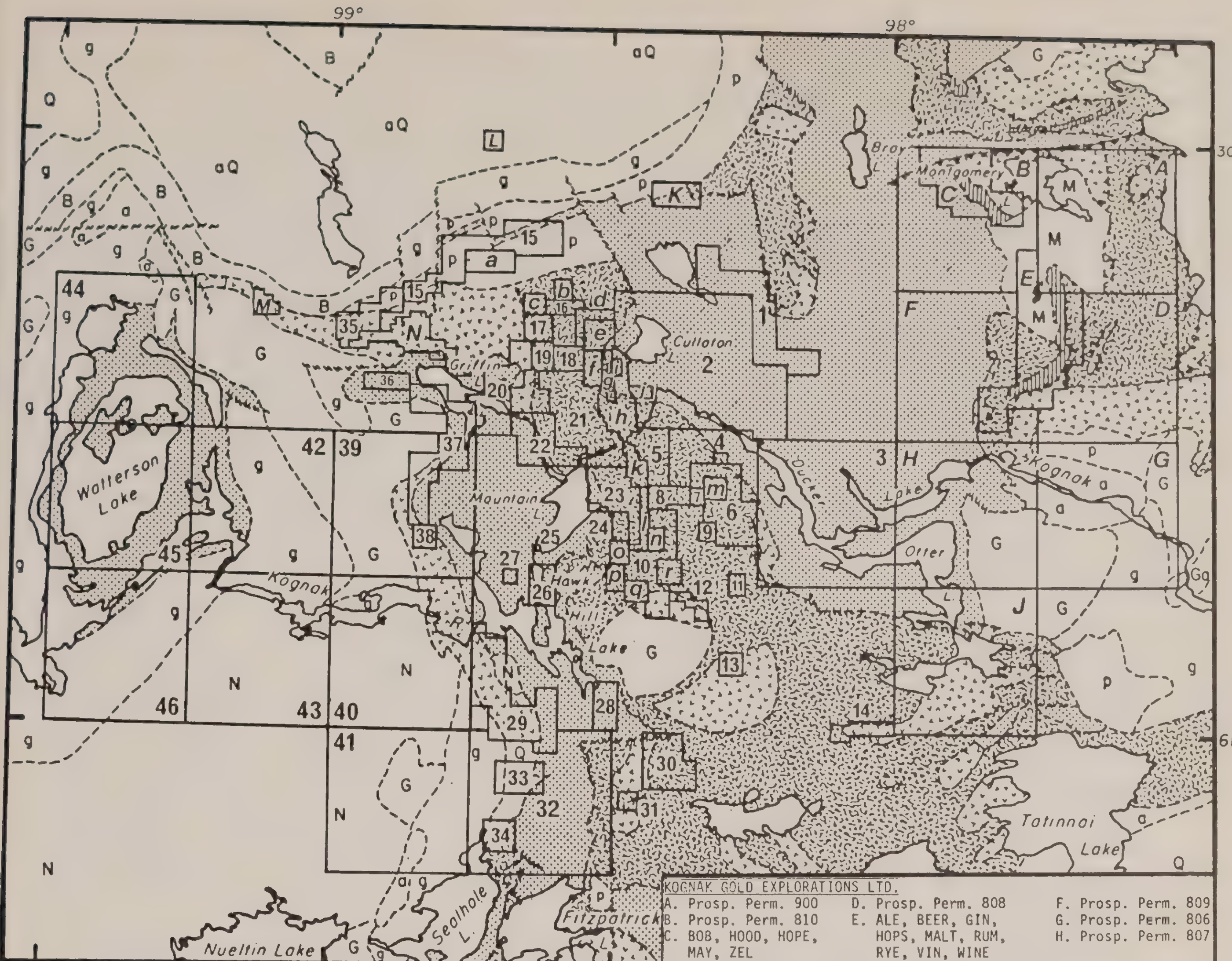
The properties held by Suncor Inc are listed in Figure 5-6.

LOCATION

The Hurwitz Project area extends from the west shore of Watterson Lake to north of Ducker Lake (Fig. 5-6).

HISTORY

Selco Exploration Company Ltd explored the Cullaton Lake and Mountain Lake areas in the 1960's and discovered a number of gold showings. One of these showings, the B-Zone Deposit, was brought into production in 1981 by Cullaton Lake Gold Mines Ltd. The A to P, BECKY, COR, PETE and ROD claims were



KOGNAK GOLD EXPLORATIONS LTD.
A. Prosp. Perm. 900
B. Prosp. Perm. 810
C. BOB, HOOD, HOPE, MAY, ZEL
D. Prosp. Perm. 808
E. ALE, BEER, GIN, HOPS, MALT, RUM, RYE, VIN, WINE
F. Prosp. Perm. 809
G. Prosp. Perm. 806
H. Prosp. Perm. 807

ESSO MINERALS CANADA LTD.
J. Prosp. Perm. 760
K. BANSHEE

DENISON MINES LTD.
L. RICH 1-16

NORANDA EXPLORATION COMPANY LTD.
M. FIVER 1-16
N. GRIF 1, ROY 1-31, STRIDER 1-74

CULLATON LAKE GOLD MINES LTD.
a) Cullaton Lake Project
a. DOVE
b. PAGE
c. CHAS
d. DOC, HAL, SOC
e. COD
f. BO
g. FOX, HUGH, LEW
j. BEA
k. BPB, PEN 3-31
l. JOHN, KAREN, MARIE, MICK, RITA
m. SUN
n. JUDY
o. NOBE
p. RON
q. SHAW
r. LYNNE
b) B-Zone Gold Deposit
h. AIR 1-12, CEP, CORNER, DWE 1-17, GILT 1-15, 17-22, 25-29, MAC, SUE, TAIL

ROYEX STURGEX MINING LTD.
i. MIK 3-5, 11-13

SUNCOR INC.
1. MIKE 1-16
2. COR 1-19
3. Prosp. Perm. 905
4. FRANK
5. KEVIN 1-3
6. PAUL 1-5
7. H
8. H 2
9. G
10. ZAK 1-4
11. E
12. DAY, FRI, 13
13. WED 11
14. BAR 1-2
15. A 1-7
16. RAY 1
17. WED 4
18. SPORT
19. TOO 1-3
20. DON 1-5, 0
21. PETE 1-5
22. WED 5-6, 8
23. WED 7, 9-10
24. PETE 6
25. BECKY
26. L 1
27. L 2
28. C 1, 2
29. K 1-8
30. B 1-3
31. B 4
32. Prosp. Perm. 826
33. J 1-2
34. D
35. WED 1-3
36. P
37. ROD 1-5
38. M
39. Prosp. Perm. 828
40. Prosp. Perm. 829
41. Prosp. Perm. 827
42. Prosp. Perm. 830
43. Prosp. Perm. 832
44. Prosp. Perm. 834
45. Prosp. Perm. 831
46. Prosp. Perm. 833

HELIKIAN
- N: Nueltin Lake porphyritic granite

APHEBIAN
- aQ: Quartz monzonite
- B: BATE LAKE SEDIMENTS: dolomite, phyllite, arkose, siltstone, paragneiss
- HURWITZ GROUP: orthoquartzite, greywacke, conglomerate arkose, dolomite, siltstone, argillite.
- M: MONTGOMERY LAKE GROUP: siltstone, arkosic quartzite, greywacke, conglomerate.

ARCHEAN
- Ga: Gabbro
- Q: Quartz monzonite
- G: Granodiorite, massive to foliated
- g: Quartzo-feldspathic gneiss, granodioritic gneiss, layered gneiss
- HENIK GROUP:
- p: Paragneiss, pelitic gneiss
- Greywacke, slate, minor iron-formation and volcanic flows
- Iron-formation
- a: Amphibolite, melanocratic gneiss
- Mafic to felsic volcanic flows and pyroclastics, arenites, ultrabasic flows

FIGURE 5-6: Geology and properties, Kognak River area (Geology from Eade, 1981a).

staked in 1981 to cover anomalies detected during a 3,560-line-km Tridem, magnetometer and radiometric survey and a reconnaissance geochemical lake water and sediment survey. Prospecting Permits 826 to 834 and the 13, A 3-7, DAY, FRI, SPORT, TOO 1-3, WED 1-11 and ZAK 1-4 claims were acquired in 1982. Prospecting Permits 830 to 834 were relinquished and Prospecting Permit 905 was acquired in 1983. The BAR 1-2, DON 1-5, FRANK 1, H 2-3, KEVIN 1-3, MIKE 1-6, PAUL 1-5, RAY 1-2, SIKSIK and ZAK 5-6 claims were added to the property in 1983.

DESCRIPTION

The eastern part of the area explored is underlain by a north-northwest-trending, 25- to 50-km-wide belt of Archean Henik Group clastic and volcanic rocks flanked by basins of Aphebian Hurwitz Group quartzitic sediments. The clastic component of the Henik Group includes greywacke and slate, metagreywacke, pelitic schist and gold-bearing iron-formation. The mafic volcanic flows and pyroclastics that underlie these clastic rocks outcrop at the edges of the belt.

The prospecting permits to the west overlie a basin of Hurwitz Group sediments centered on Watterson Lake and separated from the basins to the east by intrusions of Nueltin Lake porphyritic granite and Archean granodiorite. The central basin of Aphebian rocks is a synform with a slightly arcuate axis trending south to the west of Mountain Lake. The eastern basin extends from west of Ducker Lake and consists of a number of anticlines and synclines disrupted by east-southeast- and north-northwest-trending faults.

The Hurwitz Group has been divided into 6 formations, all of which outcrop in the area. Conglomerate and greywacke of the basal Padlei Formation are overlain by orthoquartzite and arkose of the Kinga Formation. These are overlain by slate, shale and siltstone of the Ameto Formation, in turn overlain by dolomite, argillite, phyllite and siltstone of the Watterson Formation. The top two units of the Hurwitz Group are the Ducker Formation, consisting of greywacke and siltstone, and the Tavani Formation, an assemblage of arkose and impure quartzite, conglomerate and dolomite. All these rocks are intruded by gabbro sills.

CURRENT WORK AND RESULTS

The newly acquired prospecting permits were explored in 1982 with a 511-sample lake sediment geochemical survey. Prospecting and a 148 line-km helicopter-borne radiometric survey were done on Prospecting Permit 826 and 90 soil samples were collected from Prospecting Permit 828. Anomalies detected and staked in 1981 were explored with a 820-sample lake sediment survey and a 570-sample soil survey, prospecting, mapping of both bedrock and Pleistocene geology, reconnaissance to detailed ground VLF-EM, MaxMin EM and magnetometer surveys and, in a few areas, trenching. Four grids totalling 225.1 line-km were established. Interesting coincident EM, magnetometer and geochemical anomalies were outlined.

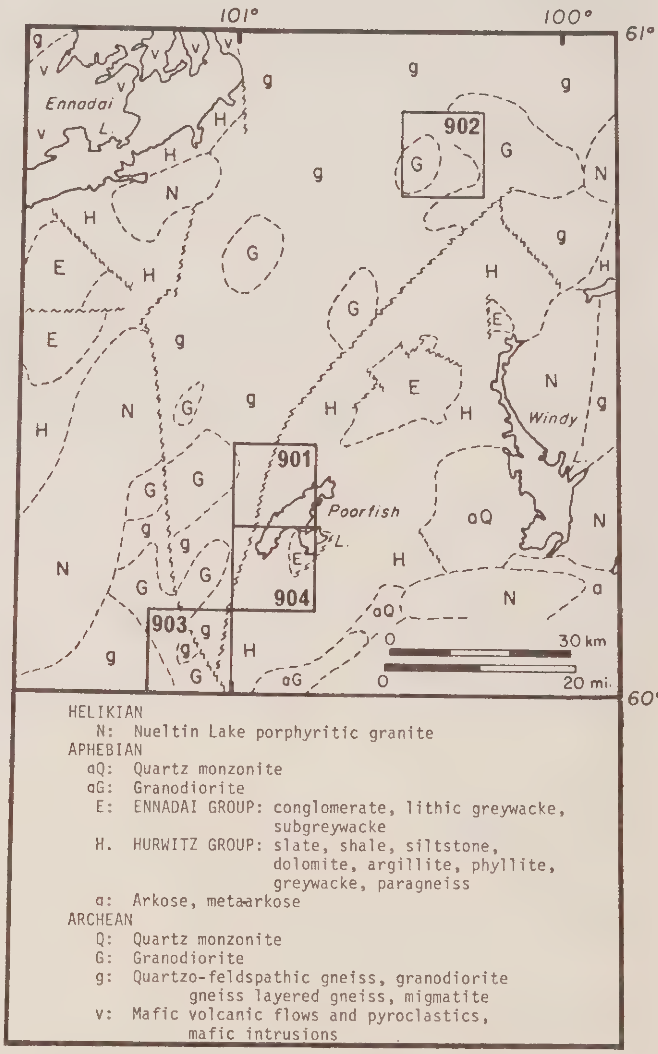


FIGURE 5-7: Geology and properties, Windy Lake area (Geology from Eade, 1981a).

Table 5-1

HURWITZ PROJECT DETAILED SURVEYS
DONE IN 1982 (o) or 1983 (●)

CLAIMS	GRIDDING (line-km)	MAP	PROSPECT	SOIL SAMPLING	BOULDER SAMPLING	MAGNETOMETER	VLF-EM	MAXMIN EM	OTHERS
A 1	● (16.1)			o		o●	o●	o	
A 2	● (15.7)			o		o●	o●	o	
A 4-5	o (44.0)		o	o	o				
A 6-7	o (42.5)		o	o	o				
B 1	● (10.8)					o●	●	o●	
B 1, 2	● (17.6)	●				●	●	●	
BAR 2	● (29.7)	●				●	●		
C 1, 2							o		
COR 1	● (13.7)	●				●	●		
COR 3, 6	● (23.2)	●				●	●		
COR 4, MIKE 1, 2	● (49.4)	●				●	●	●	
COR 6	● (6.0)					●	●		
COR 8	● (23.0)	●				●	●		
COR 9, 10	● (19.5)	●				●	●		
COR 18	● (13.5)					●	●		
COR 19	● (7.5)					●	●		
E	● (6.0)	●				●	●		
FRI, DAY, 13		●	●						
G	● (7.0)			o		●	●		
H	● (16.2)	●				●	●	●	1ddh/124m
K 3	● (14.3)	●				●	●		
K 4	● (28.2)	●				●	●	●	
KEVIN 1, 2	● (9.1)	●				●	●		2ddh/248m
O, TOO 3, DON 1-3	● (35.2)	●				●	●	●	
PETE 1, TOO 1-3 (D Zone)	o● (134+)	●				o	o	o	I.P. 17ddh/1034m
PETE 3	● (35.5)	●				●	●		
PETE 5, WED 10	● (29.6)					●	●		
PETE 6	● (15.8)	●				●	●		
ROD 1-5, M, P				o				o	7 trenches
ROD 2-3, Prosp. Perm. 828	● (39.0)	●				●	●	●	2ddh/246m
TOO 1, WED 1, DON 1 (D Zone North)	● (26.2)					●	●		
WED 2	● (3.0)	●							
WED 5-6, 8-9		o	o			o	o		
WED 7, 10					o				2 trenches
ZAK 1-4	o (4.6)	o	o		o				

In 1983, Prospecting Permit 905 was prospected and 27 grids totalling 510.8 line-km were established and explored with mapping, prospecting, boulder sampling, magnetometer, VLF-EM, MaxMin EM and in one area I.P. surveys (Table 5-1). Twenty-two holes totalling 1,653 m were drilled in four areas.

PROSPECTING PERMITS 901 TO 904

Golden Rule Resources Ltd — Gold
150, 1300 - 8th St., SW — 65 C/2,3,7,16
Calgary, Alta., T2R 1B2

REFERENCES

Eade (1971); Laporte (1974a, 1981).

DIAND assessment reports: 081626, 081627, 081628, 081629.

PROPERTY

Prospecting Permit 904	65 C/2 NW
Prospecting Permit 903	65 C/3 SE
Prospecting Permit 901	65 C/7 SW
Prospecting Permit 902	65 C/16 SW

LOCATION

The permits are west and north of Windy Lake (Fig. 5-7).

HISTORY

The four permits were acquired in 1982. Prospecting Permits 901 and 904 cover parts of the area held as Prospecting Permits 134 and 132 by Yellowknife Bear Mines Ltd from 1969 to 1972. Reconnaissance stream sediment and water geochemical surveys done in 1969 outlined 12 areas of interest, 6 of which were further explored in 1970 (Laporte, 1974a). None of the 6 areas are within the Golden Rule Resources Ltd permits.

The area of Prospecting Permit 901 was held by Uranerz Exploration and Mining Ltd as Prospecting Permit 443 from 1977 to 1978. Airborne radiometric surveys, geological mapping and prospecting of anomalies failed to discover uranium concentrations (Laporte, 1981).

DESCRIPTION

A major arcuate fault trending north-northeast to the west of Poorfish Lake separates an Archean complex of grey biotite granodiorite gneiss, intruded by massive to foliated granodiorite to quartz monzonite, from Aphebian Ennadai and Hurwitz Group rocks. The southern three permits straddle this fault and are underlain to the west by the granodiorite complex and to the east by argillite, phyllite, greywacke, dolomite and paragneiss of the Hurwitz Group. Conglomerate and greywacke of the Ennadai Group outcrop in the northeast corner of Prospecting Permit 904. Prospecting Permit 902 lies entirely within the basement complex.

CURRENT WORK AND RESULTS

A photogeological study and prospecting of magnetic features outlined on published aeromagnetic maps did not detect gold concentrations of interest.

CULLATON LAKE PROJECT

Cullaton Lake Gold Mines Ltd	Gold
400, 111 Richmond St., W	65 G/1,2,7,8
Toronto, Ont., M5H 2G4	

REFERENCES

Eade (1974); Laporte (1983c, 1984).

DIAND assessment reports: 081662, 081666, 081668, 081671, 081674, 081706, 081746, 081747, 081748, 081749, 081750, 081751, 081752, 081753, 081754, 081755, 081756.

PROPERTY

The claims held by Cullaton Lake Gold Mines Ltd and forming part of the Cullaton Lake Project are listed in Figure 5-6.

LOCATION

The claims are near the B-Zone Gold Deposit, west of Cullaton Lake and east of Mountain Lake (Fig. 5-6).

HISTORY

The Cullaton Lake area was first staked by Selco Exploration Company Ltd who, from 1961 to 1967, explored a number of gold showings with prospecting, geological and geophysical surveys, boulder and soil sampling, diamond drilling and trenching. Most of the claims listed in Figure 5-6 were staked for O'Brien Energy and Resources Ltd in 1978 to cover anomalies detected by an EM and magnetometer survey flown in 1977. Magnetometer, self potential and boulder sampling surveys, done on the claims in 1979 and 1980 indicated the presence of gold-bearing iron-formation on most of the claims. The PEN claims were drilled by Cominco Ltd in 1979, but no economic concentrations of gold were outlined (Laporte, 1983c). Cullaton Lake Gold Mines Ltd. acquired the claims in 1980. Claims BEA, DOVE, HUGH and LEW were recorded in June, 1981. Claims BPB and MAC were staked in 1982 and claims DOC, SOC and HAL were acquired in 1983.

DESCRIPTION

The claims are underlain by greywacke, argillite, phyllite, tuff and magnetic iron-formation of the Archean Henik Group. Selco Explorations Company Ltd explored for gold in sulphide-bearing sections of the iron-formation and in fractures in the overlying Aphebian quartzites.

CURRENT WORK AND RESULTS

In 1983, grids were established on the BEA, BO, CHAS, COD, DOVE, FOX, JUDY, LYNNE, NOBE, PAGE, RON and SHAW claims and explored with geological mapping and prospecting, boulder sampling, magnetometer, MaxMin EM and/or VLF-EM surveys. Most claims cover conductors with coincident magnetic anomalies attributed to bands of iron-formation. Ten anomalies were drilled and 3 interesting gold-bearing zones were intersected.

SHEAR LAKE SHOWING

Royex Sturgex Mining Ltd	Gold
800, 65 Queen St., W	65 G/7,8
Toronto, Ont., M5H 2H6	61°18'N,98°30'W

REFERENCES

Eade (1974); Laporte (1983c, 1984).

PROPERTY

MIK 3-5 and 11-13	65 G/7,8

LOCATION

The claims are 1.6 km southwest of Cullaton Lake and 4.8 km north of the Cullaton Lake Gold Mines Ltd adit on the B-Zone Deposit (Fig. 5-6).

HISTORY

The Shear Lake Showing was first staked in September of 1946 and was explored by Hudson Bay Mining and Smelting Ltd and Selco Exploration Company Ltd (Laporte, 1983c). Claims MIK 1-30 were staked in 1972 and transferred to Royex Sturgex Mining Ltd in 1973. Two holes totalling 166.7 m were drilled in

1973 and three trenches were blasted in 1979. Twenty-four MIK claims lapsed in 1978. Geological mapping and trenching in 1981 outlined a 200 m^2 area of potential ore (Laporte, 1984).

In 1982, Cullaton Lake Gold Mines Ltd entered a joint venture agreement with Royex Sturgex Mining Ltd through which development costs and proceeds would be shared 70-30.

DESCRIPTION

The showing is on the western edge of a 36 by 50 km basin of Aphebian Hurwitz Group metasediments. The Hurwitz Group sediments unconformably overlie Archean Henik Group greywacke and slate that enclose gold-bearing iron-formation. Numerous east- to east-southeast- and north-northwest-trending faults dissect the Aphebian basin.

The gold occurs in zones of open fractures and breccias in orthoquartzite. Pyrite, magnetite and chlorite are associated with the gold at depth, but nearer the surface these minerals are altered to hematite, limonite, goethite and saponite. Visible gold, as fine flakes and dendrites, is relatively common in the oxidized material.

CURRENT WORK AND RESULTS

Thirteen holes totalling 2,060.8 m were drilled on the Shear Lake Showing in 1983. The results of the first few holes were so encouraging that a decline was started in June to evaluate the drill-indicated zones by bulk-sampling. The 427 m decline reached the 61 m level in November. Six gold-bearing zones, 3 of which are new discoveries, were encountered in the decline. Samples (cut to 34.2 ppm) taken from the decline walls assayed:

Zone	Width (m)	Au content (ppm)
E-16	1.5	17.8
E-17	1.5	14.0
E-18	3.1	11.6
E-18.5	4.6	12.0
E-19	3.1	13.3
E-20	6.1	6.8

Drifting for 58 m east and west of the decline indicates that the E-19 zone contains an average 28.4 ppm Au over widths of 0.9 to 1.8 m (samples cut to 34.2 ppm). The showing is believed to contain 1 million tonnes of ore to the 183-m level (Cullaton Lake Gold Mines Ltd. Annual Report).

GRIFFIN LAKE PROJECT

Noranda Exploration Company Ltd.	Gold, Nickel
2130 Notre Dame Ave.	65 G/7
Winnipeg, Man., R3H 0K1	61°19'N,98°51'W

REFERENCES

Eade (1974); Laporte (1981).
DIAND assessment report: 081562.

PROPERTY

GRIF 1, ROY 1-31, STRIDER 1-74. 65 G/7

LOCATION

The claims are northwest of Griffin Lake (Fig. 5-6).

HISTORY

The BULK 1-4, CEDAR 1-7, FIVER 1-16, GOR 1-9, ROY 1-31 and STRIDER 1-74 claims were staked in 1977 to cover INPUT anomalies detected in 1976. Mapping and prospecting were used to explore the claims in 1977 (Laporte, 1981). All but the FIVER, ROY and STRIDER claims lapsed in 1979. The FIVER claims lapsed and the GRIF claim was staked in 1982.

DESCRIPTION

The property covers part of a 2- to 5-km wide, east-trending belt of volcanic and ultramafic flows north of Griffin Lake. These Archean Henik Group rocks are overlain north and west of Griffin Lake by Aphebian Hurwitz Group quartzitic sediments and are in contact to the north with Archean paragneiss and pelitic gneiss.

The 1977 work indicated that the spinifex-textured ultramafic flows on the STRIDER claims are enriched in Ni, Cu, Cr and Co. Gold occurs with arsenopyrite and pyrite in the metavolcanics.

CURRENT WORK AND RESULTS

Three newly established grids and one pre-existing grid were mapped and surveyed with magnetometer and VLF-EM. The new grids cover iron-formation interbedded with volcanic and ultramafic flows. Channel sampling of the iron-formation did not detect gold concentrations, but massive to disseminated sulphides in the ultramafic flows contained 2.1 to 0.73% Ni. One quartz vein in a carbonate and sulphide facies exhalite zone in the volcanics contained 37 ppm Au.

BANSHEE CLAIM

Esso Resources Canada Ltd.	Gold
237 - 4th Ave., SW	65 G/8
Calgary, Alta., T2P 0H6	$61^{0}27'N,98^{0}24'W$

REFERENCES

Eade (1974).

DIAND assessment reports: 017051, 081580.

PROPERTY

BANSHEE 65 G/8

LOCATION

The claim is 5 km north of Bernier Lake (Fig. 5-6).

HISTORY

Two gold-bearing zones were discovered and staked as the GREG 1-16 claims by prospectors working for Selco Northern Ltd. in October, 1964. Mapping, trenching and boulder sampling were done in 1965, but the property was allowed to lapse in 1967. O'Brien Energy and Resources Ltd. restaked the area as the MORT claim in 1978 but did not record any work. The BANSHEE claim was staked in 1981.

DESCRIPTION

Archean Henik Group paragneiss and pelitic gneiss derived from greywacke and enclosing layers of metamorphosed magnetic iron-formation trend east in the northern half of the claim. These rocks are overlain to the south by quartzite, slate and dolomite of the Aphebian Hurwitz Group.

The work done in 1965 outlined two distinct, narrow and parallel zones of gold concentration in iron-formation consisting of alternating bands of magnetite and biotite schist. Twelve of the 142 samples collected from the 23- and 32-m-long trenches contained 7 ppm Au or more.

CURRENT WORK AND RESULTS

The 1982 geological mapping, prospecting and magnetometer surveys outlined the two gold showings. The gold is in chloritic sulphide-bearing quartz-feldspar-biotite schist.

Eleven holes totalling 169.8 m were drilled on the Trench Showing and intersected up to 2.22 ppm Au over 3.75 m and 9.58 ppm over 0.33 m. Three holes totalling 32.31 m on the Midnight Showing intersected up to 3.98 ppm Au over 3.05 m.

DRAM CLAIMS

Esso Resources Canada Ltd.	Gold
237 - 4th Ave., SW	65 G/16
Calgary, Alta., T2P 0H6	$61^{0}55'N,98^{0}23'W$

REFERENCES

Eade (1974).

DIAND assessment report: 081575.

PROPERTY

DRAM 1-2 65 G/16

LOCATION

The claim extends west from the northwest shore of Carnecksluck Lake to the northern tip of Nowyak Lake.

HISTORY

The claims were staked in August, 1981 after the discovery of a boulder containing 139.3 ppm Au.

DESCRIPTION

An east-northeast-trending belt of Archean Henik Group volcanics is intruded, in the Carnecksluck Lake area, by grey to pink granodiorite. The contact between volcanics and granodiorite trends northeast across the claims. Greywacke of the Henik Group outcrops along the volcanic-intrusion contact on a peninsula at the northeast end of Nowyak Lake.

CURRENT WORK AND RESULTS

A grid covering the contact between volcanics and granodiorite was established in 1982 and surveyed with VLF-EM. Mapping, prospecting, trenching and the drilling of 5 holes totalling 69 m indicated that the gold is in pyrite- and chalcopyrite-filled fractures in granodiorite. The randomly oriented fractures are less than 1 cm wide. The best intersection was 8.62 ppm Au over 2 m.

KOGNAK RIVER PROJECT

Kognak Gold Explorations Ltd.	Gold
402, 27 Queen St., E	65 H/4,5
Toronto, Ont., M5C 2M6	$61^{0}15'N,97^{0}45'W$

REFERENCES

Eade (1974); Laporte (1974a, 1983a, 1984).

DIAND assessment report: 081504.

PROPERTY

The claims and prospecting permits held by the company are listed in Figure 5-6.

LOCATION

The properties cover an area extending north from Otter Lake, across the Kognak River to the north shore of Montgomery Lake (Fig. 5-6).

HISTORY

Five of the prospecting permits were acquired in 1981 and Prospecting Permit 900 was acquired in 1982. Prospecting Permits 806 and 807 cover the northern half of the area previously held as Prospecting Permit 46 by Selco Exploration Company Ltd. from 1964 to 1967 and as Prospecting Permit 150 by Atlantic Richfield Canada Ltd from 1969 to 1972. Prospecting Permits 808 to 810 and 900 cover ground staked for Iso Mines Ltd in 1969. Exploration in the mid 1960's included mapping, prospecting, trenching and diamond drilling of gold showings south of Otter Lake. In the late 1960's and early 1970's, the focus of exploration was uranium in the Aphebian sediments (Laporte, 1974a). The area held as Prospecting Permit 900 was held as Prospecting Permit 600 by PNC Exploration (Canada) Company Ltd from 1979 to 1982. Airborne geophysical surveys and geochemical lake sediment and water surveys were done on the permit in 1979 (Laporte, 1983a).

Geological mapping, prospecting, lithogeochemical sampling and reconnaissance VLF-EM and magnetometer surveys done on Prospecting Permits 806 to 810 in 1981 outlined 6 areas of interest (Laporte, 1984). The 14 claims were staked in August 1983 to cover parts of Prospecting Permits 808 to 810 which expired in 1984 along with Prospecting Permits 806 and 807.

DESCRIPTION

Three major rock assemblages outcrop within the area. The Archean Henik Group, which consists of volcanic rocks, greywacke, phyllite, argillite and thick sequences of hematite- and magnetite-rich iron-formation, outcrops east and west of Montgomery Lake, southeast of Ducker Lake and north of the Kognak River. Rocks of this group are overlain south of Montgomery Lake by conglomerate and quartzite of the Aphebian Montgomery Lake Group. The youngest rocks present are orthoquartzite, slate, shale, siltstone, dolomite, greywacke, impure arenites and gabbro sills of the Aphebian Hurwitz Group, which outcrop in a north-trending basin in the western permit areas. The Henik Group rocks are intruded by Archean granodiorite and metamorphosed to schist and amphibolite along the Kognak River.

CURRENT WORK AND RESULTS

A 5 line-km grid was established in the northwest corner of Prospecting Permit 900 in 1982 and explored with a magnetometer survey. This survey outlined a 300-m-wide anomaly caused by iron-formation, boulders and outcrops of which contained 0.2 to 4.8 ppm Au.

LONGSWAMP CLAIMS

Esso Resources Canada Ltd	Gold
237 - 4th Ave., SW	65 H/15
Calgary, Alta., T2P OH6	$61^{o}47$'N,$96^{o}36$'W

REFERENCES

Bell (1970)

PROPERTY

LONGSWAMP 1-6	65 H/15

LOCATION

The claims are centered on a large unnamed lake 6 km southwest of the south end of Yandle Lake.

HISTORY

LONGSWAMP 1-6 were staked in September, 1981 and lapsed in 1983.

DESCRIPTION

Archean Kaminak Group felsite, tuff, agglomerate, quartz porphyry and minor greywacke underlie the claims. The volcanic rocks are intruded in the northern part of the property by grey hornblende diorite and biotite-hornblende tonalite.

CURRENT WORK AND RESULTS

Five holes totalling 35.42 m were drilled in two areas of LONGSWAMP 6 but the results were not reported.

BAKER LAKE-THELON RIVER AREA

The Baker Lake-Thelon River area is underlain by a complex of gneisses and gneissic to massive granitic intrusions enclosing Archean volcanics to the south and Aphebian metasediments, with minor volcanic flows, to the northwest. Late Aphebian to early Helikian, shallow-dipping conglomerates, and arkosic sandstone and mudstone intruded by syenitic bodies and overlain by intermediate to felsic volcanic flows and pyroclastics cover the basement complex south and southwest of Baker Lake. Flat-lying quartzose conglomerates and sandstones of Paleo-helikian age overlie the basement complex in the Thelon River area.

Exploration in the area was for uranium in the basement complex, in Aphebian sediments of the Hurwitz and Amer Groups and in late Aphebian to early Helikian Dubawnt Group sediments and volcanics.

SHANE LAKE PROJECT

Noranda Exploration Co. Ltd. — Uranium
2130 Notre Dame Ave. — 55 M/11,14,15; 65 P/10
Winnipeg, Man., R3H 0K1

REFERENCES

Blake (1980); Laporte (1983c, 1984); LeCheminant and others (1976, 1977); Reinhardt and others (1980).

DIAND assessment reports: 081553, 081608, 081693, 081697, 081703.

PROPERTY

Figure 5-8 lists the claims held by Noranda Exploration Company Ltd. south of Baker Lake.

LOCATION

The main group of claims extends southwest from Christopher Island to east of Kazan Falls. The MW claims are northeast and the SC claims are west of Thirty Mile Lake (Fig. 5-8).

HISTORY

The VASO claims were prospected and staked in 1978 and the remaining claims were acquired in 1979. The claims cover ground previously explored as part of the TMT Project by Pan Ocean Oil Ltd. and its precursors between 1969 and 1976. The claims were explored in 1979 with airborne and ground geophysical surveys, geochemical surveys, prospecting and geological mapping (Laporte, 1983c). INPUT conductors were explored in 1980 with geophysical surveys and the drilling of 16 holes totalling 846.88 m. The SC and MW claims were mapped and prospected. An INPUT survey was flown on the MS claims in 1981 and the two conductors detected were surveyed with ground geophysical, geological and geochemical surveys (Laporte, 1984). Two A, 2 MW, 2 V and 4 VASO claims lapsed in 1981. Seven MS, 2 MW, 3 V and all the SC claims lapsed and the area of the VASO 5-10 claims was reduced in 1982. Claim MW 2 lapsed in 1983.

DESCRIPTION

The claims cover the unconformity along the eastern and southern edges of the Baker Lake Basin. Dubawnt Group South Channel Formation conglomerate and Kazan Formation arkose outcrop in the western and northern parts of the claim groups and overlie Archean and/or Aphebian layered gneiss, gneissic intrusions and metavolcanic and metasedimentary belts.

The 1979 geophysical surveys outlined 13 conductive zones on the MS, V and VASO claims. Drilling in 1980 indicated that the conductors on the V and VASO claims are caused by graphitic chloritic tuffs and metavolcanics of the basement complex. The conductors on the MS claims are chloritic schists and mylonite zones. No economically interesting concentrations of uranium were detected in the drill holes, but track etch and scintillometer anomalies were detected in 1981 coincident with and adjacent to conductors on the MS and V claims (Laporte, 1984).

CURRENT WORK AND RESULTS

Sixteen holes totalling 1,217 m were drilled on claims MS 8, 14 and 15 in 1982. The holes probed anomalies outlined in 1981 and encountered uranium, copper and silver concentrations in fractured South Channel Formation conglomerate, the regolith overlying the basement and graphitic metasediments of the basement complex. The graphitic metasediments contained up to 2% Cu over 3 m and 93.6 ppm Ag.

A grid established on claims MS 3 to 6 was explored with magnetometer, HEM, VLEM, VLF-EM and Track Etch surveys. The grid covered uranium, copper, silver and molybdenum concentrations in fracture and breccia zones in Dubawnt Group rocks near the unconformity.

On the V 1, 2 and 7 and VASO 5 and 6 claims, 3 grids were established in 1982 and subjected to geological, prospecting, magnetometer and HEM surveys. One grid was also explored with VLF-EM and radiometric surveys. One grid covers pyrite-graphite-bearing quartz sericite schist in amphibotite; the second covers diorite instrusions in metavolcanics and metasediments of the basement complex, and the third covers fracture zones in South Channel Formation conglomerate and the adjacent basement complex.

HLEM, VLF-EM and magnetometer surveys were done in 1983 on the grid covering the fracture zones. Mapping and sampling indicate that the fractures in the conglomerate are filled with quartz, hematite, chlorite, chalcopyrite, silver and pitchblende and contain up to 0.4% U_3O_8 and 0.44% Cu. Geological mapping and a 385-sample till survey of the area south of Baker Lake and east of Bissett Lake outlined uranium- and copper-bearing

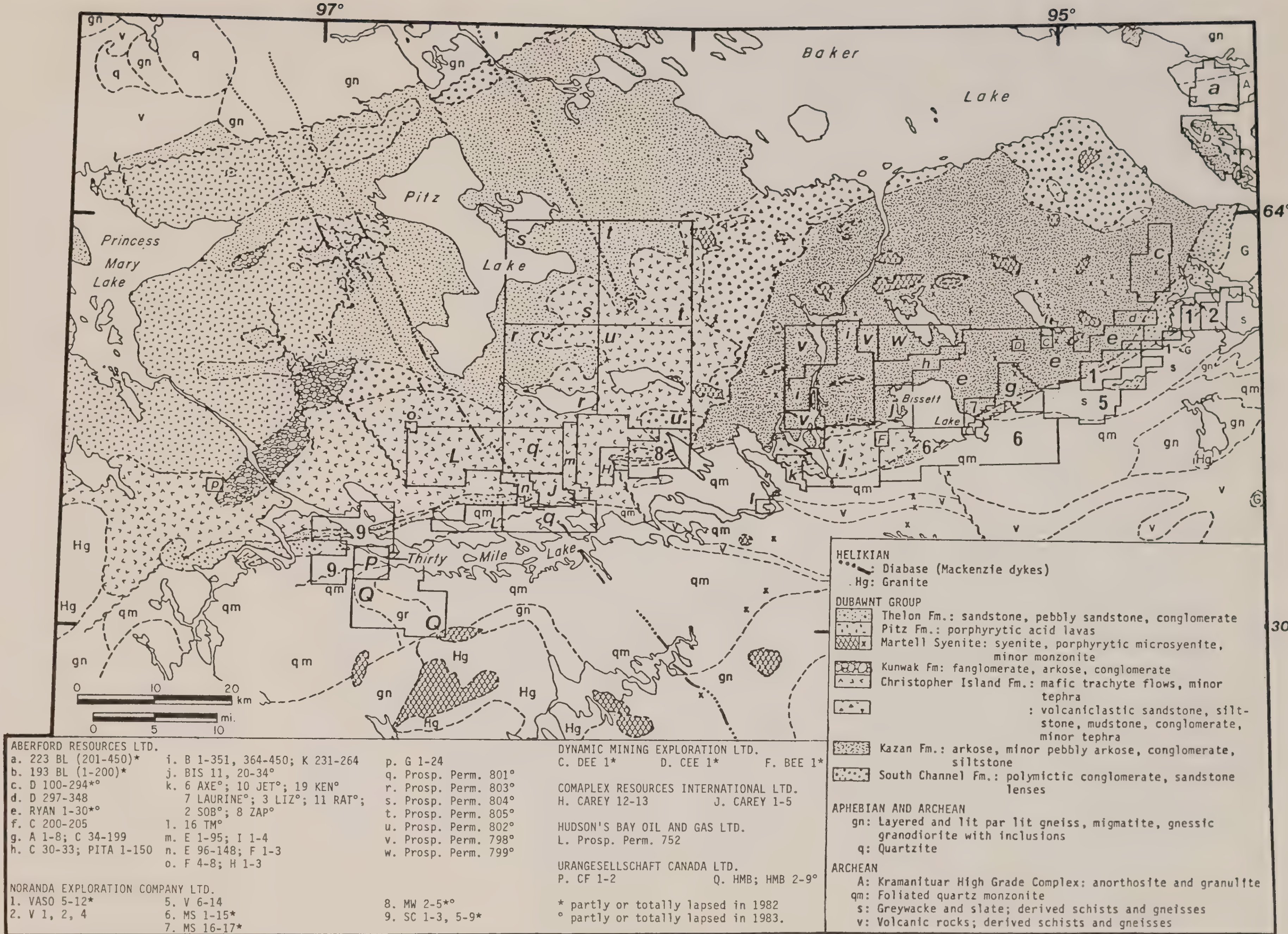


FIGURE 5-8: Geology and properties, Baker and Thirty Mile Lakes area (Geology from Blake, 1980; Donaldson, 1966; Eade, 1981b; Reinhardt and others, 1980 and Schau and Hubert, 1977).

impregnations and fracture fillings in Kazan Formation sandstone adjacent to lamprophyre dykes and one fracture-related showing in basement rocks which contained up to 6.0% U_3O_8 and 1778 ppm Ag.

A small fracture-related showing in a Christopher Island Formation volcanic vent on the MW 2 and 4 claims was gridded in 1983. VLF-EM and magnetometer surveys did not outline interesting anomalies.

In 1983, a grid was also established in an area of syenite subcrop on claim MS 8 and explored with mapping, magnetometer and VLF-EM surveys. Two areas of frost heaved syenite boulders were outlined and of the 40 samples collected, 22 contained more than 0.1% U_3O_8, 10 contained more than 0.2% U_3O_8 and one contained 0.9% U_3O_8. The uranium is in dark red syenite with chlorite and carbonate alteration and containing iron and copper sulphides.

TK PROJECT

Aberford Resources Ltd.	Uranium
300 - 5th Ave., SW	55 M; 56 D; 65 P
Calgary, Alta., T2P 2M7	63°52'N;95°30'W

REFERENCES

Blake (1980); Donaldson (1965); Laporte (1983c, 1984); LeCheminant and others (1976, 1977, 1979b); Miller (1980); Reinhardt and others (1980); Schau and Hubert (1977).

DIAND assessment reports: 081558, 081650.

PROPERTY

The numerous properties held by Aberford Resources Ltd. in the Baker Lake-Kazan Falls area are listed in Figure 5-8.

LOCATION

The claims and prospecting permits cover the area from north of Christopher Island to north of Forde Lake. The major claim groups are east of Kazan River (Fig. 5-8).

HISTORY

Aberford Resources Ltd. and its precursors have been exploring the area south and east of Baker Lake since 1968. Airborne and ground geophysical surveys, geochemical and geological surveys done from 1969 to 1976 and in 1979 led to the discovery of numerous uranium showings that were explored by diamond drilling. Cominco Ltd. optioned the properties in 1975 and operated the project in 1975 and 1976. The option was relinquished in 1977. The BIS 21-34 and RYAN 1-30 claims were staked in 1979 to cover the area east and west of Bissett Lake (Laporte, 1983c).

Airborne geophysical surveys, ground geophysical surveys and diamond drilling led to the discovery of the Bissett Creek South Showing in 1980. Prospecting Permits 798 to 805 were acquired in early 1981 and the properties were explored with lake water and sediment geochemical surveys, mapping, prospecting and detailed geochemical and geophysical surveys (Laporte, 1984). Prospecting Permit 800 was relinquished and 5 RYAN, 332 BL and 116 D claims lapsed in 1982. The other prospecting permits were relinquished in 1983 and 78 B, 9 BIS, 76 D and 19 RYAN claims were allowed to lapse.

DESCRIPTION

The properties cover the eastern end of the Baker Lake Basin, a 55-km-wide, northeast-trending belt of early Helikian Dubawnt Group rocks. These sediments and trachytic volcanics rest unconformably on the Archean/Aphebian basement complex along the southern and eastern edge of the basin and are in fault contact with the basement along the northern margin of the basin. A description of the various rock types forming the basement complex and filling the basin, and of the three types of uranium showings discovered before 1980, is given in Miller (1980) and summarized in Laporte (1983c).

The Bissett Creek South Showing, discovered in 1980, consists of uranium concentrations along the faulted contact between Kazan Formation sandstone and the basement complex. Uranium-bearing float and showings were discovered 2 km east of this showing in the East Bissett Lake Showing in 1981 (Laporte, 1984).

CURRENT WORK AND RESULTS

In 1982, the basement complex between Thirty Mile Lake and Andrews Lake was mapped and prospected. The complex is an assemblage of intercalated chloritic and muscovite-sericite-rich metasediments enclosing quartzite, thin layers of calc-silicate and conformable amphibolite. Graphitic layers are also present. Detailed geological work in the vicinity of known showings did not reveal any extensions.

In the East Bissett Lake Showing area, Turam EM, VLF-EM and gravity surveys were used to better define the geophysical conductors previously detected. Gravity surveys were also done in the Bissett Creek South Showing area and north of Thirty Mile Lake.

Analysis of 801 frost-boil samples collected in 1981 and 1982 from the Bissett Creek South grid delineated 13 anomalies, 11 of which correspond to EM conductors. Analysis of the 655 lake sediment samples collected in the permit areas in 1981 outlined 20 anomalous areas.

YATHKYED PROJECT

Noranda Exploration Company Ltd. — Uranium
2130 Notre Dame Ave. — 65 J/5-7,10,11
Winnipeg, Man., R3H OK1

REFERENCES

Blake (1980); Eade (1980); Laporte (1983a, c; 1984).

PROPERTY

The claims held by Noranda Exploration Company Ltd. and AGIP Canada Ltd. are listed in Figure 5-9.

LOCATION

Most of the claims are part of a large group extending southwest from west of Yathkyed Lake to Angikuni Lake. Other claims are south, west and northwest of the main group (Fig. 5-9).

HISTORY

The 681 NIP claims were acquired in late 1975 after a radiometric, magnetic and VLF-EM survey was flown by Kenting Earth Sciences Ltd. Prospecting of the 1975 anomalies and ones detected during a second survey flown in 1976 resulted in the discovery of new uranium showings and the staking of 2,668 claims. The 865 BIR, DUG, GIO-MOR, HED, KOL, MOLSON, SUE, SUN and VANG claims were acquired in 1977.

INPUT surveys flown in 1977 outlined two zones of conductors on the RIB, FST and SUE claims. Nine holes were drilled in 1977 and 20 in 1978 to test the conductors in the RIB-FST area. A showing on the NIP claims was also drilled in 1978 (Laporte, 1983a). Six holes were drilled in 1979 on the RIB-FST grid, the BOG claims and the SUE claims (Laporte, 1983c). Geological mapping, IP, VLF-EM and magnetometer surveys, till geochemical surveys and diamond drilling were used to explore anomalies and showings on the BOG, GIO-MOR, G2 and RIB claims in 1980. As well, 9 holes were drilled to test 3 of the 7 conductors outlined on the NIP and FOG claims (Laporte, 1984).

Early in 1981, Pan Ocean Oil Ltd. (now Aberford Resources Ltd.) explored the Yathkyed Project properties in return for part ownership. Reconnaissance lake water and sediment surveys were completed in the summer of 1981 and the anomalies detected were prospected. Detailed surveys including VLF-EM, magnetometer, scintillometer, frost-boil geochemical sampling, mapping and prospecting were done in the vicinity of known showings and EM conductors. Six frost-boil anomalies were detected on the RIB-FST grid near the conductors drilled in 1980 and 3 uranium-silver-lead anomalies were outlined along a VLF conductor on the YAT claims. Detailed surveys on the NIP, REV and WET claims indicate that the original NIP showing is of little economic interest, but a second grid to the east covers interesting conductors and associated geochemical anomalies that could be an extension of the structure hosting 5.3 million kg U_3O_8 on the YU 1-36 claims (LGT'75 Project, Laporte, 1984).

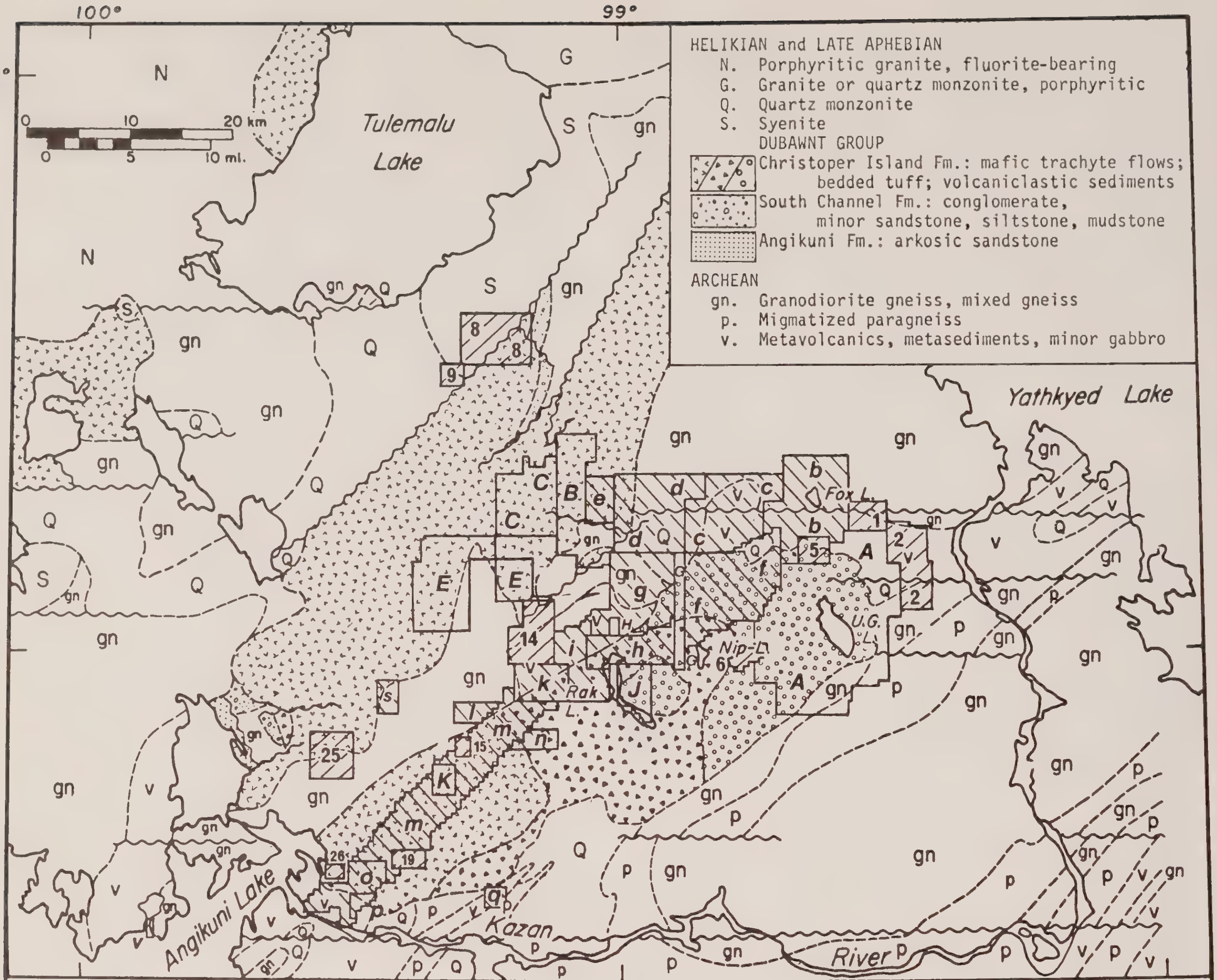
One ERM and 77 MOLSON claim lapsed in 1982 and 16 DUG, 1 FST, 16 HED, 13 PIN and 95 SUE claims in 1983.

DESCRIPTION

The main group of claims covers the northeastern, central and southern parts of a basin of Dubawnt Group sediments and volcanics and parts of the adjacent basement complex. Other claims cover parts of a second Dubawnt Group basin to the north, and outcrops of migmatized paragneiss and metavolcanics of the basement complex (Fig. 5-9). Uranium concentrations occur in quartz-feldspar mylonite, shear zones in Archean metavolcanics, syenite dykes and Dubawnt Group volcanics and sediments. The 3 conductors drilled on the NIP and FOG claims are caused by graphitic felsic tuffs and schists, graphitic amphibolite and sulphide concentrations in brecciated mafic volcanics. Uranium on the BOG claims is in a 50-to 150-m-wide zone of brecciated gneiss, granite and volcanic cemented by quartz and Dubawnt Group feldspar porphyry dykes (Laporte, 1984).

CURRENT WORK AND RESULTS

Ten holes were drilled by Aberford Resources Ltd. in 1982. Five holes totalling 406 m tested conductors on the NIP and FOG claims. Three holes totalling 321.6 m were drilled on YAT 13 and 2 holes totalling 219.2 m on RIB 10 and 15. The results of the drilling have not been reported.



Noranda Exploration Company Ltd.
b. 97 FOG; REV 1-108; TEW 1-71
c. MUR 1-36; 82 SNO; WET 1-112; ZAK 1-24
d. BOG 1-280
e. WIT 1-60
f. 355 NIP
g. 46 ICE; OG 1-56; YAT 1-32, 34-110; 57 YED
h. 103 SOG; VER 1-35
i. 146 FST°
k. RIB 1-96
l. ERM 2*
m. BIR 1-28; HED 1-16°; MOLSON 1-333*
n. VIV 4
o. 95 SUE°
p. 13 PIN°
q. DUG 1-16°
s. GIO-MOR 1-16; G2
v. AN 1-13

Aberford Resources Ltd.
1. OV 1*
2. NU 1-4*
5. YU 1-36; FUG 1-7
6. YU 37-61
8. NU 15-17*°
9. YU 801-825
14. 108 YME, LIN 1-5
15. YU 219-234*°
19. YU 325-352*
25. YU 62-161°
26. YU 62-161°

* partly or totally lapsed in 1982
° partly or totally lapsed in 1983

Urangesellschaft Canada Ltd.
A. A 1-36; AA 1-2*; B 1-36; 48 BH; BJ 1-12; C 1-36; COW 1-20; CUR 1-18°; D 1-36; E 1-36; F 1-36; G 1-36; GEB 1-8; 18 GG°; H 1-36; I 2-37; J 1-36; K 1-36; L 1-39; M 1-36; MIT 1; N 1-36; O 1-8; P 1-37; Q 1-36; R 1-36; REY 1-10; WIE 1-19°
B. BIL 1-21; BUG 1-28; 36 CRO; CW 1-20; FAR 1-10; GEO 1-28; GER 1-19; GU 1-28; LAU 1-15; ROD 1-28; ROL 1-21; TB 1-12; UG 1-21; VAN 1-21
C. UHF 1-5*

Comaplex Resources International Ltd.
E. ANGI 9-16°; NORM 1

Essex Minerals Company
G. TUL 1-31, 44-61
H. TUL 266-273
J. LAK 1-14, 17-102
K. ORK 1-42*

FIGURE 5-9: Geology and claims, Yathkyed-Tulemalu Lakes area (Geology from Blake, 1980 and Eade, 1981b).

NOWLEYE LAKE PROJECT

Urangesellschaft Canada Ltd.	Uranium
3100, 2 Bloor St., E	65 K/5-7
Toronto, Ont., M4W 1A8	$62^{o}27'N, 101^{o}12'W$

REFERENCES

Laporte (1983a, c, 1984); Tella and Eade (1981).

DIAND assessment reports: 081613, 081729.

PROPERTY

The claims are north of Nowleye and Kamilukuak Lakes (Fig. 5-10).

HISTORY

Prospecting Permits 488 and 489, the first properties, were acquired on January 1, 1978. The FNM 1-17 and NN 1-12 claims were added in August, 1978 and the FOO claims in September, 1978. The FOR, GO, GUS, IT and TO claims were staked in 1979 and the BB 1-28 claims were staked in 1980. The prospecting permits, the FOO, FOR, GO, GUS, IT and TOO claims and some of the FNM and NN claims lapsed in 1981. Claims BB 29-36 and HLV 1-3 were added to the properties in 1981 and LD 1-2 in 1982.

Airborne and ground geophysical surveys, reconnaissance and detailed geochemical surveys, mapping and prospecting from 1978 to 1981 outlined four main showings and numerous other areas of radioactivity (Laporte, 1983a, c, 1984).

DESCRIPTION

Trachytic volcanic flows and tephra of the Helikian Dubawnt Group Christopher Island Formation underlie most of the properties. These supracrustals are in fault contact to the west with Archean or Aphebian quartz monzonite augen gneiss, which also outcrops on the north shores of Kamilukuak and Nowleye Lakes.

Work in 1978 led to the discovery of two main showings northwest of Nowleye Lake. The South Showing consists of a 150-m by 75-m area of frost-heaved, cataclastic, granitic gneiss boulders. The boulders are highly chloritized and hematized and contain pyrite, coffinite, pitchblende and yellow uranium oxides. Twenty-one grab samples of frost-heaved boulders contained 0.03 to 4.0% U_3O_8. The North Showing, 800 m away, consists of a 60-m by 50-m area of frost-heaved boulders of pitchblende-bearing hematized Christopher Island Formation trachytes and altered Pitz Formation quartz-feldspar porphyry. The boulders sampled contained 0.191 to more than 5% U_3O_8 (Laporte, 1983c).

Uranium concentrations in Christopher Island Formation agglomerate and flows were outlined on claims FNM 11 and NN 7 in 1980. In 1981, areas of anomalous radioactivity in frost heave and outcrops of Christopher Island Formation were staked as the BB 29-36 and HLV claims (Laporte, 1984).

CURRENT WORK AND RESULTS

In 1982, the BB and HLV claims were mapped at 1:30,000 and prospected. A 2-km-long train of Christopher Island Formation trachyte boulders containing up to 0.453% U_3O_8 was discovered north of the BB claims and staked as the LD claims.

New grids and extensions to existing grids were constructed on the BB, FNM, HLV and NN claims and explored with geological mapping and prospecting, scintillometer, magnetometer, VLF-EM and geochemical surveys involving the collection of 3,750 A_0 and B_1 soil samples and 2,294 till samples. All of the showings and anomalies explored are fracture-controlled uranium concentrations in Christopher Island Formation trachyte. Samples containing up to 0.173% U_3O_8 were collected, but the extent of these showings is limited.

Ten holes totalling 1,583.8 m were drilled on the North and South Showings on the BB claims. Discontinuous uranium concentrations were detected in 5 holes with the best intersection grading 0.173% U_3O_8 over 3 m, 1 m of which contained 0.435%. The pitchblende is associated with pyrite, chlorite, hematite and carbonate in fractures in deformed augen gneiss and in brecciated Christopher Island Formation volcanics.

In 1983, a 34.3-line-km grid was established on the LD claims and explored with mapping, prospecting, soil sampling and scintillometer, magnetometer and VLF-EM surveys. Although interesting geophysical and geochemical anomalies were detected, the uranium content of the boulders sampled (up to 0.235% U_3O_8) was not considered sufficient to warrant drilling.

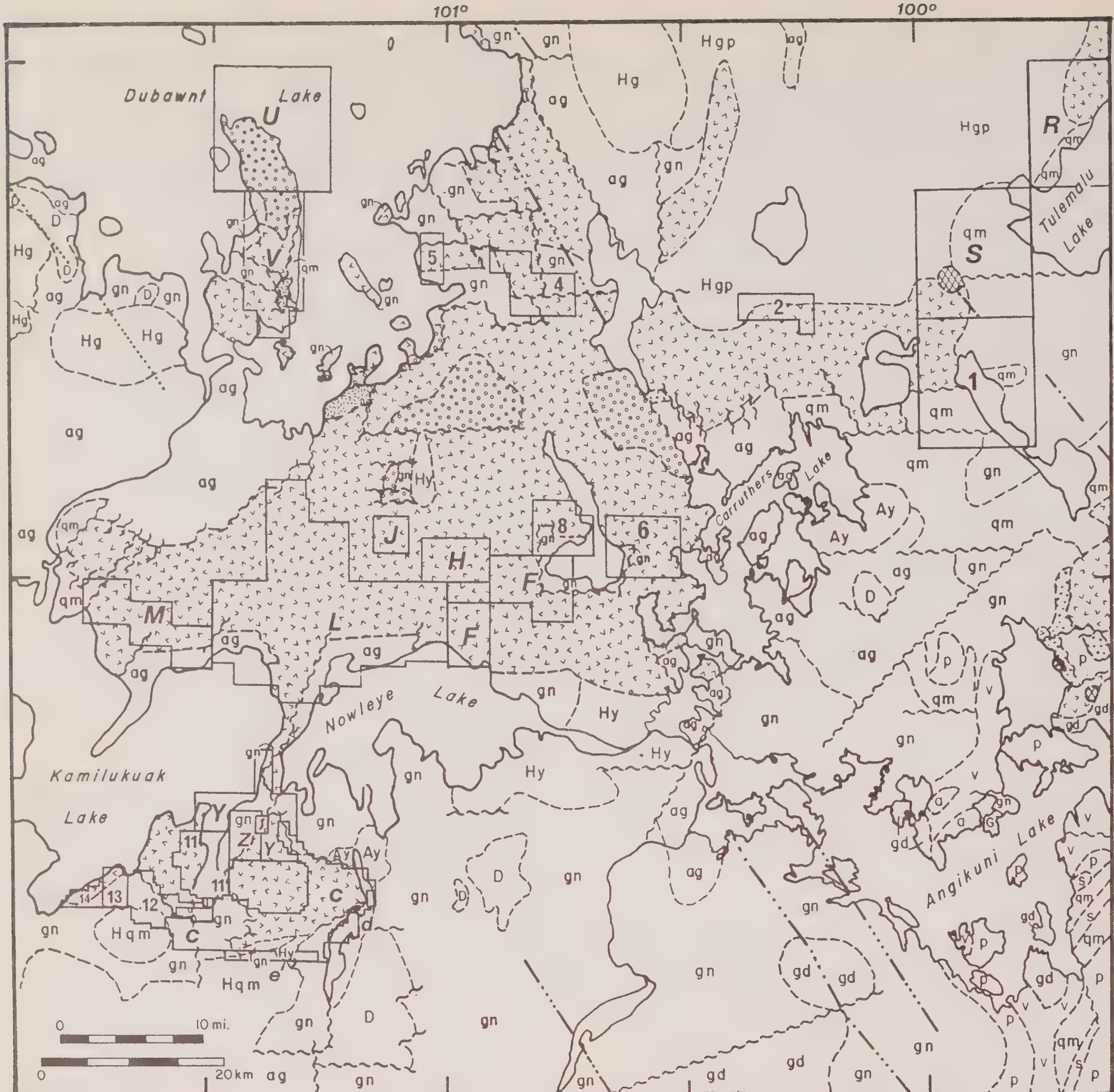
HAWK LAKE PROJECT

Noranda Exploration Co. Ltd.	Uranium
2130 Notre Dame Ave.	65 K/7,10,12,15
Winnipeg, Man., R3H OK1	$62^{o}33'N, 100^{o}45'W$

REFERENCES

Eade (1981b); Laporte (1983a, c, 1984); Tella and Eade (1981).

DIAND assessment report: 081609.



Noranda Exploration Company Ltd.
1. Prosp. Perm. 666*
Hawk Lake Project
2. SID 1-3*
4. L 5-6, 8-9°
5. ART 1-3
6. S 1-3, 6-8*
8. HAWK 1-4
Kam Lake Project
11. JEAN 1-195
12. 17 VAN, 101 WHY
13. 47 LOU
14. PHIL 1-42

Cominco Ltd.
c. KUZ 1-137*, P 1-161, 228-263, 311-472
d. SHUR 1-22, 24-45
e. HO 1-3

Urangesellschaft Canada Ltd.
F. FNM 1, 10-17*°
H. HLV 1-3
J. LD 1-2
L. BB 1-36*°
M. NN 3-4, 6-7, 9-10*

Union Oil Company of Canada Ltd.
R. Prosp. Perm. 653°
S. Prosp. Perm. 652°

Taiga Consultants Ltd.
U. Prosp. Perm. 688°
V. D 1-9*

E.&B. Exploration Ltd.
Y. YAT 5-7, 13-14°
Z. REWARD 1-80, 85-93, 98-104

* partly or totally lapsed in 1982
° partly or totally lapsed in 1983

HELIKIAN
: Diabase (Mackenzie dykes)
Hgp: Granite, coarse-grained, porphyritic, rapakivi texture
Hg: Granite, equigranular to porphyritic
Hqm: Quartz monzonite to granite
Hy: Syenite
DUBAWNT GROUP
Conglomerate, arkose, sandstone; may in part be equivalent to Thelon Fm.
Pitz Formation: quartz-feldspar porphyries and associated volcanic rocks
Alkalic igneous intrusions including Martell syenite
Christopher Island Fm.: volcanic flows, pyroclastics and volcanogenic sediments
Angikuni Fm.: sandstone, mudstone; also includes conglomerate, arkose and wacke

APHEBIAN/ARCHEAN
D: Diorite, quartz diorite, minor gabbro
Ay: Syenite to quartz monzonite, foliated to massive
qm: Quartz monzonite, massive to slightly foliated
ag: Quartz monzonite augen gneiss

ARCHEAN
gd: Foliated granodiorite, granodiorite orthogneiss
gn: Layered gneiss, migmatite, gneissic granodiorite
p: Paragneiss, pelitic and melanocratic gneiss
v: Volcanic rocks

FIGURE 5-10: Geology and properties, Nowleye-Kamilukuak Lakes area (Geology from Eade, 1981b).

PROPERTY

The claims explored as part of the HAWK Lake project and listed in Figure 5-10 are held jointly by Noranda Exploration Company Ltd. and AGIP Canada Ltd.

LOCATION

The claims are northeast of Nowleye Lake and north of Kamilukuak Lake (Fig. 5-10).

HISTORY

Noranda Exploration Company Ltd. registered the HAWK 1-3 claims in July, 1978, and 80 other claims in 1979. The ART and SID claims were staked in 1980. All but 11 of the claims staked in 1979 lapsed in 1981. The S and SID claims lapsed in 1982 and the L claims in 1983. AGIP Canada Ltd. acquired 50% ownership of the claim and became the project operator in 1982.

Prospecting, mapping, geochemical and geophysical surveys done between 1978 and 1981 outlined a number of uranium-rich boulder trains and showings. Nineteen Winkie holes totalling 134.4 m and 16 BQ holes totalling 1,408.6 m were drilled on the HAWK claims from 1978 to 1980. Six Winkie holes totalling 48.5 m and 9 BQ holes totalling 437.6 m were drilled on the S claims in 1980. (Laporte 1983a, c, 1984).

DESCRIPTION

The claims cover the unconformity and fault contacts between the granitic basement complex and the Helikian Christopher Island Formation volcanics. A fault-bounded basement re-entrant underlies the southern part of Hawk Lake and consists of quartzo-feldspathic gneiss. Basement rocks on the northern claim groups include quartz monzonite augen gneiss and quartzo-feldspathic gneiss intruded to the north and east by Helikian coarse-grained rapakivi-textured granite.

The showing on the HAWK claims is an 80- by 150-m zone of brecciated Christopher Island Formation volcaniclastic sediments cemented with quartz and calcite. Uraninite and secondary uranium minerals occur to a depth of 50 m while fine-grained molybdenite occurs to a 70-m depth. The second showing drilled, on the S claims, consists of pitchblende in a carbonate-cemented breccia in Christopher Island Formation trachyte flows. Uranium has been found over an area 40 m wide and greater than 75 m long to a depth of at least 62 m.

Other interesting uranium concentrations were outlined on the ART and L claims. The L-1 Showing consists of pitchblende-filled fractures in biotite trachyte at the fault contact between basement gneiss and volcanics. The L-2 Showing is a train of uranium-bearing trachyte boulders near a sliver of basement gneiss. A large field of radioactive, fractured hematitic boulders containing 0.041 to 2.5% U_3O_8 extends more than 500 m on the ART claim.

CURRENT WORK AND RESULTS

Three of the showings explored in 1981 (Laporte, 1984) were drilled in 1982. Twenty holes totalling 1247.86 m tested the L-1 Showing and intersected phlogopite trachyte, sandstone, siltstone and boulder conglomerate overlying foliated granite. A zone approximately 60 m by 100 m was delineated which contains fracture-controlled uranium concentrations in trachytic flows.

The showing on the ART claims was tested with 8 holes totalling 579.25 m. The drilling intersected massive trachyte cut by a series of barren quartz veins.

Three holes totalling 244.82 m were drilled on the HAWK claims but failed to outline extensions to the previously defined showing.

THIRTY MILE LAKE PROJECT

Urangesellschaft Canada Ltd.	Uranium
3100, 2 Bloor St., E	65 O/9; P/10
Toronto, Ont., M4W 1A8	

REFERENCES

Laporte (1979, 1981, 1983a, c, 1984); LeCheminant and others (1979a, b, 1980, 1981).

DIAND assessment reports: 081579, 081704.

PROPERTY

The properties explored as part of the Thirty Mile Lake Project are listed in Figure 5-11.

LOCATION

The Thirty Mile Lake Project covers parts of the area south and west of Thirty Mile Lake (Fig. 5-11).

HISTORY

The original properties, Prospecting Permits 374 to 376, were acquired in April, 1976 (Laporte, 1979, 1981). The POT 1-12 and UTH 1-3 claims, covering parts of Prospecting Permit 374, and the JJ 1-4 claims were recorded in 1978 (Laporte, 1983a). Prospecting Permits 634 and 635 were acquired in 1979 along with 10 FC claims, covering parts of Prospecting Permit 375, and the CF, OTL and HMB 1

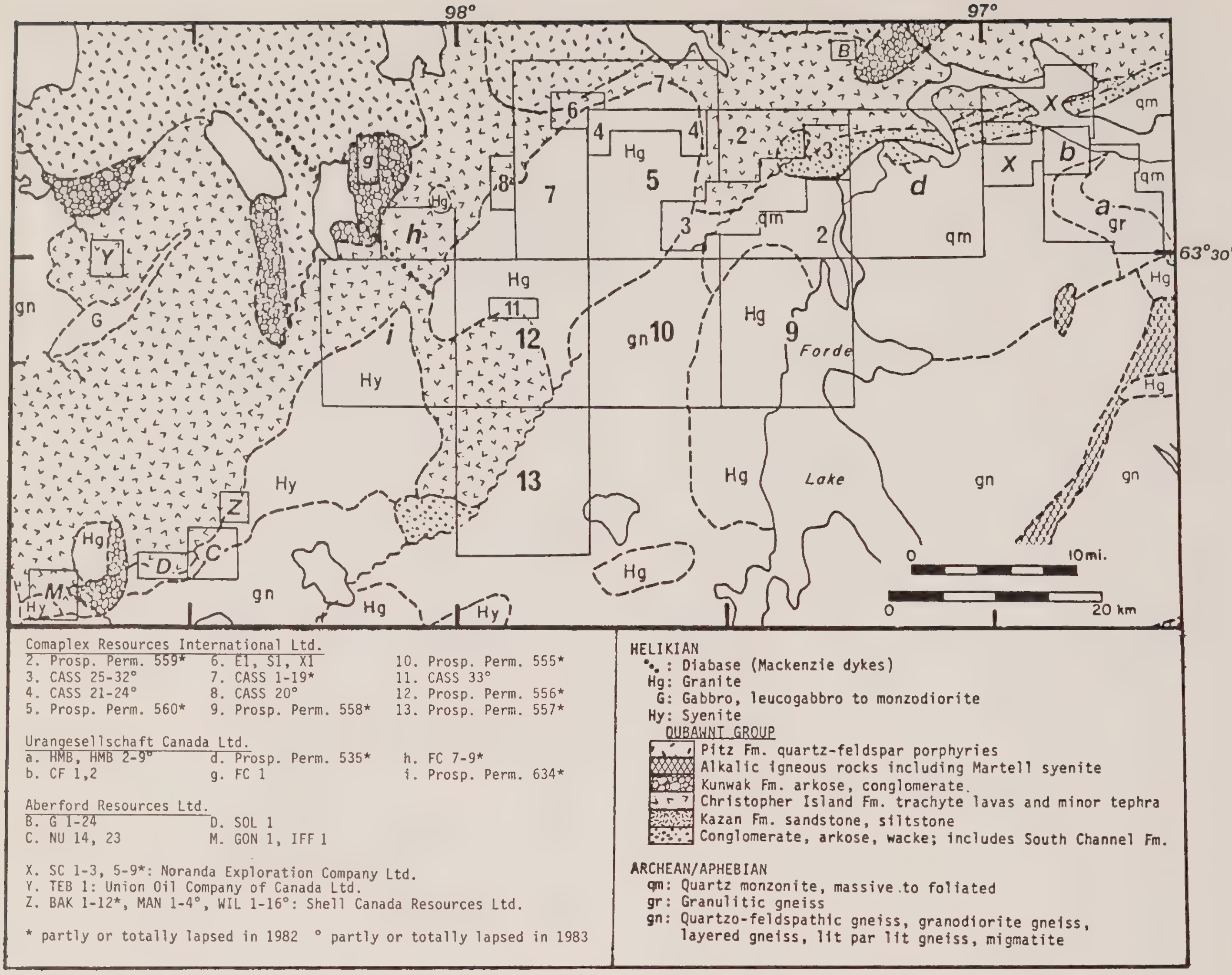


FIGURE 5-11: Geology and properties, Forde Lake area (Geology from Blake, 1980 and Eade, 1981b).

claims (Laporte, 1983c). Claims HMB 2-8 were added to the properties in 1980 and the JJ, POT and UTH claims were allowed to lapse. Claims FC 2-6 and 10 and OTL lapsed in 1981; FC 7 and 9 lapsed in 1982, and HMB 8 in 1983. Claim HMB 9 was staked in 1982.

From 1976 to 1979, airborne radiometric, VLF-EM and magnetometer surveys, reconnaissance geochemical surveys, mapping and prospecting were used to explore the area west of Thirty Mile Lake. A number of anomalies were outlined and explored with ground geophysical, geochemical and geological surveys. In 1980 and 1981, most of the work was done south of Thirty Mile Lake. Mapping, prospecting, detailed geochemical and geophysical surveys and trenching were used to explore a uranium occurrence on claim HMB (Laporte, 1984).

DESCRIPTION

The properties are on the southern and western edges of a basin of Dubawnt Group sediments and volcanics that extends south and west from Baker Lake. Trachytic lavas and tephra of the Christopher Island Formation are overlain, to the north and east of the study area, by dacite and rhyolite flows and welded tuffs of the Pitz Formation. Fanglomerate, siltstone, sandstone and conglomerate of the Kunwak Formation outcrop at the contact between the two volcanic units on the FC claims. Helikian syenite and granite plutons intrude the Christopher Island Formation volcanics to the south and east of the claims. The basement complex outcrops on the HMB and CF claims and consists of Archean and Aphebian foliated quartz monzonite, layered gneiss and

granulitic gneiss. The showings worked on before 1980 are small pitchblende veinlets in the volcanics and 3- to 15-m-wide and 100-m-long zones of quartz-fluorite veinlets and calcite stringers in hematized black andesite overlying sandstone and siltstone.

CURRENT WORK AND RESULTS

Three grids were established on the CF 2 (LZ grid), FC 1 (JB-79 grid) and HMB 5 and 9 (SAL grid) claims in 1982 and the HMB grid on claim HMB and HMB 7 was extended. The remaining claims were mapped and prospected at 1:31,680. The HMB extension and LZ grids were explored with mapping at 1:2,500, overburden sampling (1,157 sites on the LZ grid and 1,509 sites on the HMB grid), magnetometer, VLF-EM, MaxMin EM and gravity surveys. The SAL grid was mapped and surveyed with scintillometer, magnetometer and VLF-EM. The JB-79 grid was explored with magnetometer and VLF-EM surveys and a 142-sample overburden geochemical survey. Trenching was done on showings on the HMB, SAL and LZ grids.

The SAL grid covers a zone of uranium-bearing calcite-filled fractures up to 3 m wide and 100 m long in amphibolite and gneiss. On the LZ and HMB grids, uranium is associated with alkali metasomatism along mylonitic shears in garnet-biotite gneiss. Grab samples of episyenite contain up to 0.074 and 0.695% U_3O_8.

In 1983, 10 holes totalling 1,280.5 m were drilled on the HMB grid. Eight holes tested coincident gravity low, magnetic low and geochemical anomalies and defined a pipe-like body 150-m-wide and 250-m-long in a 400-m-wide body of episyenite derived from garnet biotite gneiss. Core samples contained up to 0.173% U_3O_8 over 1.2 m. The 2 other holes tested uranium concentrations in brecciated gneiss and intersected a narrow fracture zone containing up to 0.109% U_3O_8 over 0.9 m.

Mapping, prospecting and soil sampling on the grid on claim FC 8 outlined fracture-controlled uranium concentrations in Christopher Island Formation trachyte. The pitchblende is associated with chalcopyrite, covellite, galena and pyrite.

LONGSPUR PROJECT

Comaplex Resources Internat'l Ltd.	Uranium
901, 1015 4th St., SW	65 P/5,11,12
Calgary, Alta., T2R 1J4	63°33'N,97°40'W

REFERENCES

Laporte (1983c, 1984); LeCheminant and others (1977).

DIAND assessment report: 081540.

PROPERTY

The properties are listed in Figure 5-11.

LOCATION

The claims are northwest of Forde Lake (Fig. 5-11).

HISTORY

Prospecting Permits 555 to 560 were acquired by Comaplex Resources International Ltd. in early 1979 and the E, S and X claims were staked later that summer. The CASS 1-19 claims were added to the property in 1980 and the CASS 20-33 in 1981. The prospecting permits expired in early 1982 and 30 CASS claims lapsed in 1982 and 1983.

Geological mapping, prospecting, lake and soil geochemical surveys, airborne and ground geophysical surveys, trenching and diamond drilling were done on the properties from 1979 to 1981 (Laporte 1983c, 1984).

DESCRIPTION

The properties cover the contact between Aphebian or Archean quartzo-feldspathic gneiss, the overlying Helikian trachytes of the Christopher Island Formation and a large composite acid intrusion of Helikian age. To the north, the trachytes are overlain by dacite and rhyolite of the Pitz Formation.

Three showings were explored in 1980 and 1981. On the E, S and X claims, uranium occurs with quartz, grossularite, calcite, fluorite, epidote and specularite in fractures cutting the Christopher Island Formation volcanics and, to a lesser extent, the Helikian granite intrusion. Grab samples of the vein material from this BB Occurrence assayed up to 27.2% U_3O_8, but only 2 of the 9 holes drilled in 1980 intersected pitchblende veins. The Grizzly Showing on claim CASS 29 is a 10-m-wide and 70-m-long zone in Archean basement gneisses that encloses 3 pitchblende veins. The Who Showing on claim CASS 26 consists of one outcrop and several boulders of hematized and chloritized gneiss containing up to 0.177% U_3O_8.

CURRENT WORK AND RESULTS

In April, 1982, the grid on the BB Occurrence was extended over the ice covering nearby lakes and these extensions were explored with magnetometer, gradiometer and VLF-EM surveys.

LIL CLAIMS

Noranda Exploration Co. Ltd.	Uranium
2130 Notre Dame Ave.	66 A/3,4
Winnipeg, Man., R3H OK1	64°06'N,97°28'W

REFERENCES

Donaldson (1966); Laporte (1983c).

DIAND assessment report: 081606.

PROPERTY

LIL 2,3 — 66 A/3,4

LOCATION

The claims are northeast of Princess Mary Lake (Fig. 5-12).

HISTORY

Claims JIL 1-25 and LIL 1-22 were staked in 1978 to cover radioactive showings and boulders discovered by prospecting (Laporte, 1983c). All of these claims except LIL 2 and 3 lapsed in 1980 and 1981. The area of the LIL 2 and 3 claims was reduced in 1982 and the claims lapsed in 1983.

DESCRIPTION

The two claims cover outcrops of Archean and/or Aphebian volcanic rocks.

CURRENT WORK AND RESULTS

A 10.7 line-km grid was mapped, prospected and surveyed with HLEM and magnetometer. No radiometric anomalies or EM conductors were detected.

LONE GULL DEPOSIT

Urangesellschaft Canada Ltd.	Uranium
3100, 2 Bloor St., E	66 A/5
Toronto, Ont., M4W 1A8	64°27'N,96°37'W

REFERENCES

Donaldson (1966); Fuchs and others (1982); Laporte (1984).

DIAND assessment report: 081658.

PROPERTY

L 1-620 and SSL 1-128 — 66 A/5

LOCATION

The claims are north of Judge Sissons Lake (Fig. 5-12).

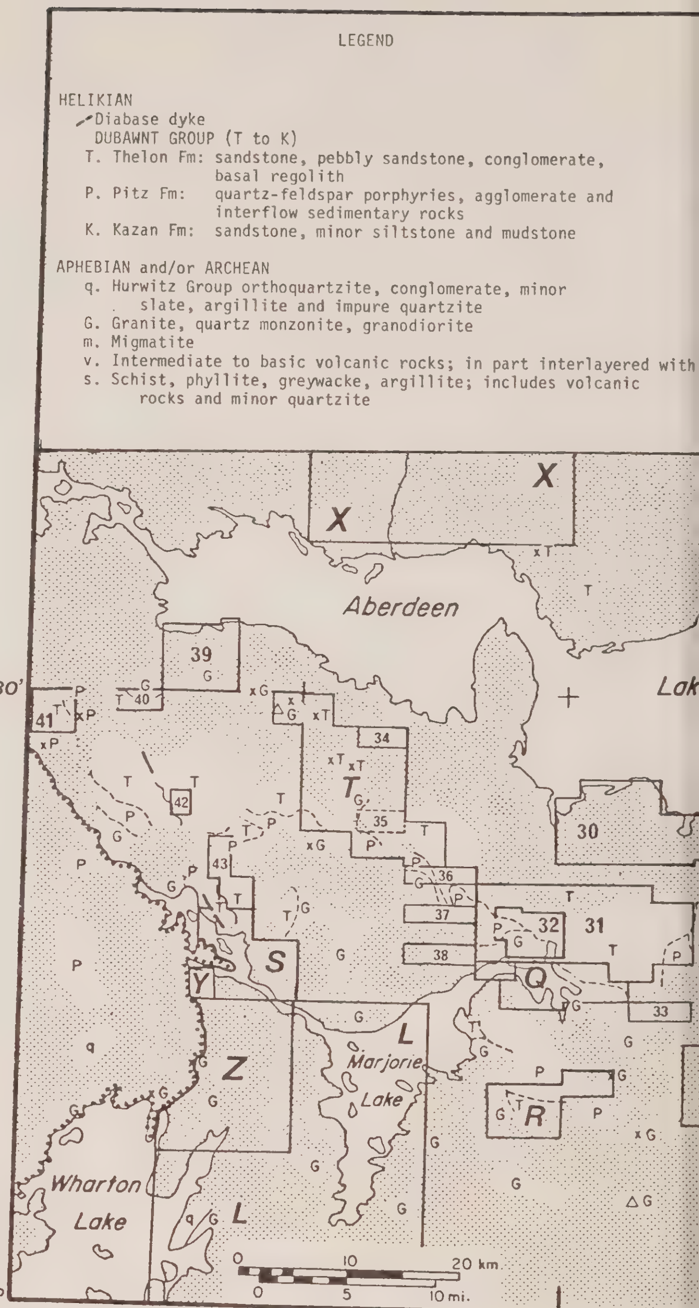
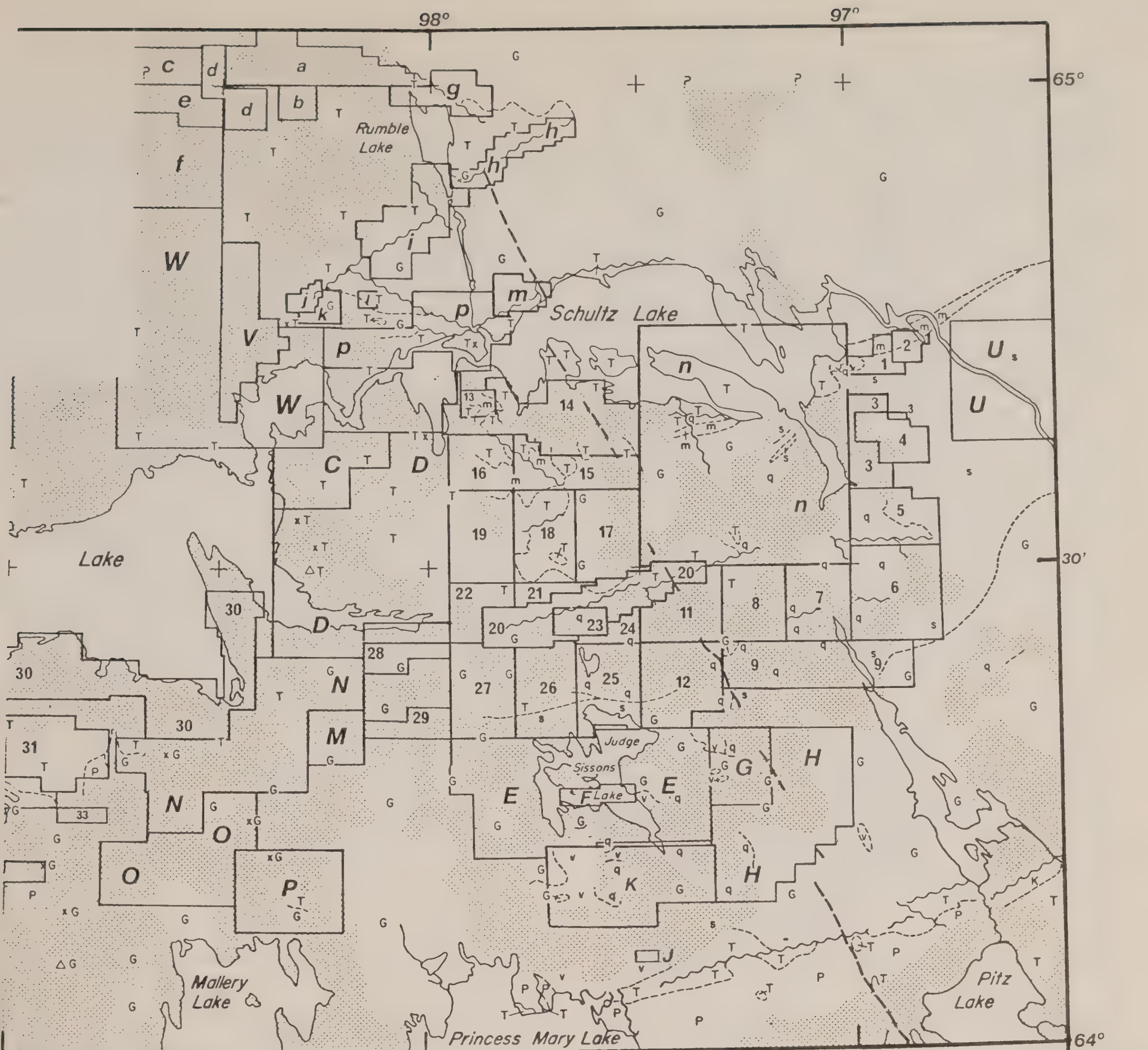


FIGURE 5-12: Geology and properties, Schultz-Aberdeen Lakes area (Geology from Donaldson, 1966 and 1969).

HISTORY

The Lone Gull Deposit was discovered in 1974 during an airborne total-count radiometric survey conducted by Metallgesellschaft Canada Ltd. on their Prospecting Permits 317 to 327. Two isolated anomalies were discovered 750 m apart. The western anomaly corresponded to frost boils containing chips



URANGESELLSCHAFT CANADA LTD.
Project K-1, Baker Lake
1: OFF 10-11
2: THE 1-82
3: OFF 2-7
4: PIZ 1-236
5: COO 1-8
6: LA 1-12
7: DOVA 1-8
8: SHAY 1-8
9: LAST 1-8*, TREE 1-4°
11: OTHA 1-8
12: BAR 1-10
13: 78 SCH
14: IT 1-591, KF 8-9
15: AJOL 1-8
16: WUNZ 1-6
17: MAN 1-8
18: WAG 1-8
19: LYS 1-8
21: PED 1-4
22: CAM 1-6
24: BYA 3-6
25: UND 1-8
26: BONG 1-8
27: BILA 1-8
28: BS 2, 12, 13°
29: BS 5, 6, 9*
Lone Gull Deposit
20: L 1-620
23: SSL 1-128
Marjorie-Aberdeen Project
30: KC 1-22, 29-33*
31: 14 BB*°
32: AB 1-100, 152-199*°
33: MAJ 25
34: BA 6*
35: BA 15*
36: MAJ 41
37: MAJ 39
38: MAJ 36
39: KA 8-12*
40: KA 23*
41: KA 21, 24°
42: KB 1*
43: KB 6,9*

WESTMIN RESOURCES LTD.
a: ITZA 1-11
b: RN 1-2
c: WGE 1-4
d: CAN 1-178
e: EXT 1-10°
f: Prosp. Perm. 541

ESSEX MINERALS COMPANY
g: ALA 1-5
h: 200 CAN*
i: ALL 1-3, 5-11*°
j: RB 1-50
k: ALE 2-5
l: ALE 1
m: KEN 1-115°

n: F 1-77 - BP MINERALS LTD.

p: ELD 1-13* - MOBIL ENERGY MINERALS LTD.

COMINCO LTD.
C: WAD 1-8
D: DEEN 1-40°
E: JUD 1-38*°

COMAPLEX RESOURCES INTERNATIONAL LTD.
F: MYR 1-2°
G: NA 1-6*°
H: XYL 1-22*

J: LIL 2, 3° - NORANDA EXPLORATION COMPANY LTD.

MARLINE MINERAL EXPLORATIONS LTD.
K: V 35-43, VW 8-14
L. Prosp. Perm. 693-695*

ANACONDA CANADA EXPLORATION LTD.
M: XW 1-4
N: VW 4-7, W 1-23, CH 1-2
O: XW 5-23°
P: V 26-34, VW 1-3
Q. CONDA 7-11°
R: CONDA 12-15°
S: CONDA 1-5°

T: MARJ 1-11 - PNC EXPLORATION (CANADA) COMPANY LTD.

HUDSON'S BAY OIL AND GAS COMPANY LTD.
U: Prosp. Perm. 755°
V: AYA 1-21°
W: Prosp. Perm. 717-718, 721*°
X: Prosp. Perm. 719-720°
Y: MARJ 1*
Z: Prosp. Perm. 716°

* partly or totally lapsed in 1982
° partly or totally lapsed in 1983

of metasediments coated with yellow uranium secondary minerals. The eastern anomaly corresponded to grass-covered hummocky terrain near an outcrop of orthoquartzite.

In subsequent years, the area of the two anomalies was gridded and explored with a number of geochemical and geophysical surveys (Fuchs and others, 1982). The SSL and L claims were staked in 1976 and Prospecting Permit 318 lapsed in 1977. Drilling from 1977 to 1980 has identified three main uranium concentrations in arkosic sediments: the Main, Central and Eastern or '46 E' Zone. At the end of 1980, drilling totalled 12,013 m in 77 holes on the Main Zone, 4127 m in 36 holes on the Central Zone and 4314 m in 40 holes on the Eastern Zone. Eleven holes totalling 1178.4 m were drilled on other anomalies and showings within the claims in 1979 and 1980. The Lone Gull grid was extended in 1981 and explored with geophysical, geochemical and geological surveys including the relogging of the core from 85 of the first 106 holes drilled (Laporte, 1984).

DESCRIPTION

The Lone Gull Deposit is in a sequence of Aphebian arkosic quartzites and metapelites. The sequence includes garnetiferous impure quartzites, mafic chloritic metasediments of possibly tuffaceous origin and well-laminated siliceous beds. It is overlain by white orthoquartzite and underlain by greywacke. Granite, quartz-feldspar porphyry, lamprophyre, syenite and a diabase dyke intrude the metasediments on the Lone Gull grid.

Most of the uranium concentrations are in fracture zones and all have a well-defined alteration envelope. In the less altered rocks, chlorite, hematite and limonite occur along fractures. The more altered rocks are characterized by pervasive clay alteration (illite) with lesser chlorite, sericite, talc, hematite and limonite. The presence or absence of specific phyllosilicates is partly dependent on lithology; sericite is more common in the orthoquartzite and the underlying impure quartzite while the feldspathic quartzites are illitized. The chlorite may be an alteration of mafic-rich layers and talc is probably restricted to magnesium-rich sediments. The distribution of hematite and limonite is independent of other secondary minerals and probably reflects local reduction potential and permeability conditions. Pitchblende is commonly associated with limonite and rarely with hematite. In the dirty quartzites, pitchblende is in small blebs along fractures and in disseminated aggregates; in granite, uranium minerals occur in discrete veins and blebs along fractures. Reserves are 16,100 tonnes of U_3O_8.

CURRENT WORK AND RESULTS

Thirty-five holes totalling 3883 m were drilled on the Lone Gull grid in 1982. Sixteen holes totalling 1955 m were drilled between lines 30+00 E and 40+00 E to test a radon anomaly and encountered discontinuous uranium concentrations extending east to line 36+00 E. The Centre Zone between 25+00 E and 29+00 E was explored with 11 holes totalling 1196 m. The last 8 holes, totalling 732 m, probed anomalies west of the Main Zone and encountered essentially barren alteration zones.

Concurrent with the drilling, the Lone Gull and Granite grids were extended and the extensions were explored with magnetometer, soil, geochemical and radiometric surveys (Fig. 5-13). Gravity surveys on the eastern and western parts of the Lone Gull grid outlined anomalies over which Track Etch cups were planted. INPUT, MaxMin and EM-16R resistivity test surveys were done on the showings. The INPUT survey did not register any anomalies, the MaxMin survey outlined a weak anomaly at high frequency and the resistivity survey detected the alteration envelope even under 50 m of orthoquartzite.

In 1983, 20 holes totalling 2932 m tested 7 gravity anomalies in areas of favourable geology on the Lone Gull grid. Intense clay alteration was encountered in all but one of the holes but the best uranium concentration detected was 110 ppm over 7.7 m. Outside of the Lone Gull grid, exploration involved mapping and prospecting of the L and SSL claims and A_0 soil sampling of areas to the east and west of the grid. Trenching in the area of a radioactive frost boil on the Granite grid indicates that uranium is in a fracture associated with a quartz-feldspar porphyry dyke. Anomalies prospected on the Lucky 13 grid were mainly associated with phosphatic concentrations.

PROJECT K-1, BAKER LAKE

Urangesellschaft Canada Ltd.	Uranium
3100, 2 Bloor St., E	66 A/5-7,10,12;B/8
Toronto, Ont., M4W 1A8	$64^{\circ}30'N, 97^{\circ}30'W$

REFERENCES

Donaldson (1966, 1969); Laporte (1983c, 1984); LeCheminant and others (1983).

DIAND assessment reports: 081546, 081566, 081658, 081673, 081687, 081718, 081772, 081773.

PROPERTY

The claims held by Urangesellschaft Canada Ltd. and forming part of this project are listed in Fig. 5-12.

LOCATION

Urangesellschaft's Project K-1 area extends north and northeast from Judge Sissons Lake to Schultz Lake and the Thelon River.

HISTORY

Urangesellschaft Canada Ltd. has been exploring the Judge Sissons Lake area since 1974 when an affiliated company, Metallgesellschaft Canada Ltd., acquired Prospecting Permits 317 to 327. Urangesellschaft Canada Ltd. acquired Prospecting Permits 352 and 353 in 1975. The SCH 1-136 and SSL 1-128 claims were acquired in 1976 and the IT 1-591, L 1-620, PIZ 1-236 and THE 1-82 claims in 1977. Most of the other claims were acquired in 1978 and the KF 1-9 and LAST 1-8 were staked in 1979. Eighty-one BS, DF, MOR, OFF and SCH claims lapsed in 1980 and 1981. In 1982, 1 BS and 2 LAST claims lapsed. Three BS and 1 TREE claim lapsed in 1983.

Reconnaissance geochemical surveys, airborne VLF-EM, radiometric and magnetometer surveys, geological mapping and prospecting of the claims in 1978 and 1979 outlined numerous anomalies. Fifty grids were established in 1979, 1980 and 1981 and explored with geological, geochemical and geophysical surveys (Laporte, 1983c, 1984). In 1980, 27 holes totalling 2127 m intersected minor uranium concentrations on three of the grids and barren granite and syenite on a fourth grid (Laporte, 1984).

DESCRIPTION

The Project involves a study of the western end of a metasedimentary belt trending northeast from Judge Sissons Lake to north of Whitehills Lake. The belt is bounded to the north and south by granitic gneisses, and the sediments are overlain to the northwest by sandstone, pebbly sandstone and conglomerate of the Thelon Formation. A regolith is present locally at the base of the Thelon Formation.

CURRENT WORK AND RESULTS

In 1982, the prospecting and mapping of 7 areas of radiometric anomalies on the northwestern claims indicated that most of the anomalies are caused by uranium-bearing phosphatic concentrations in Thelon Formation sandstone and brecciated Aphebian metasediments or concentrations of granite and gneiss boulders. Detailed geological, geophysical and geochemical surveys were done on 9 previously established grids or their extensions and 1 new grid (Fig. 5-13). Five holes totalling 587.7 m on the Queen Bess grid tested coincident geochemical and geophysical anomalies which were attributed to phosphate-enriched boulders of Thelon Formation sandstone in the drift. Two holes totalling 168.9 m tested a quartzite breccia on the Pyro grid and encountered phosphate-related uranium concentrations of up to 80.7 ppm.

On the southern and eastern claims, mapping and prospecting explored radiometric and geochemical anomalies on the BILA, TREE, SHAY, BAR, COO, OFF, THE, PIZ and BS claims. Detailed surveys were done on 8 old grids and 1 new one (Fig. 5-13). Grab samples from trenches on the LA 4 grid contained up to 2.07% U_3O_8.

In 1983, the northwestern block of claims were remapped and prospected at 1:25,000 and 2 new grids were established (Fig. 5-13). A number of the previously gridded anomalies were attributed to phosphatic concentrations.

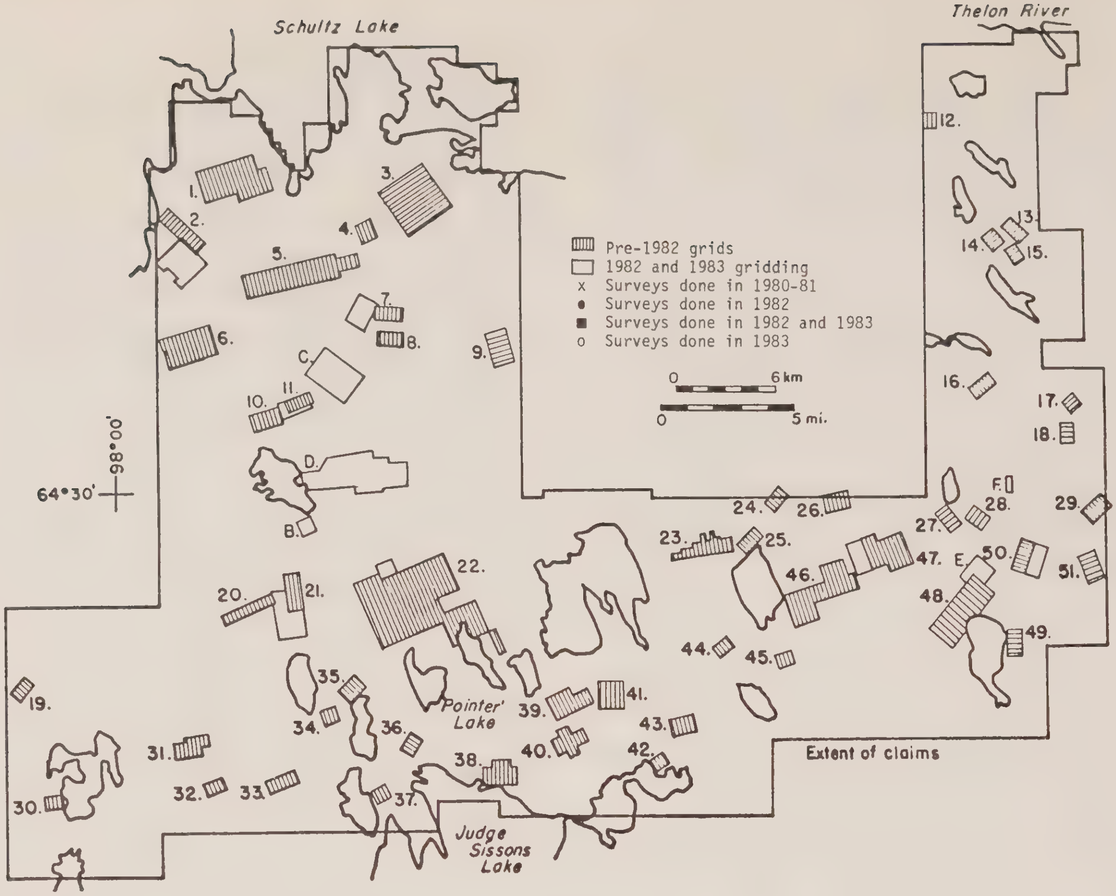
In the southern and eastern claim blocks, mapping and prospecting of the northern claims failed to detect any interesting uranium concentrations. One new and 5 old grids were explored (Fig. 5-13). Nine holes totalling 1,278 m were drilled on the LA 4 grid and outlined two types of uneconomic uranium concentrations. Pitchblende, clay alteration and pervasive hematization occur at the contact of the orthoquartzite with the underlying impure quartzite and in a breccia zone in the orthoquartzite.

MARJ CLAIMS

PNC Exploration (Canada) Co. Ltd.	Uranium
2401, 650 West Georgia St.	66 B/3,5,6
Vancouver, B.C., V6B 4N8	64°25'N,99°23'W

REFERENCES

Donaldson (1969); Laporte (1978, 1979, 1983a, c, 1984); LeCheminant and others (1983, 1984).



LOCATION NUMBER	NAME OF GRID	GRIDDING	PROSPECTING	MAPPING	Ao SOIL	B_1 TILL	WACKER DRILL	WATER	SCINTILLOMETER	MAGNETOMETER	MAXMIN EM	VLF-EM (SEATTLE)	VLF-EM (CUTLER)	RESISTIVITY	I.P.	GRAVITY	TRACK ETCH	ALPHA NUCLEAR
1	SCHULTZ	x	x	x										x				
2	IT WEST	x●	x	x●	x				●	●								
3	IT DIABASE	x	x●	x	x				x●	x		●	x					
4	IT 34	x	x	x	x								x					
5	PYRO LAKE	x	x	x●	x		x		●	x	●	x	x	x		x●	●	
6	78-S-42	x	x	x●	x●				■	x	●	x	●				●	
7	78-S-43	x■		x●	x●					x●	●	x●	x●	x		x●		
8	78-S-44	x	x●	x	x					x		x	x	x		x		
9	T LAKE	x	x●	x	x					x		x						
10	78-S-41 (QUEEN BESS)	x	x	x●	x●	x	x		x●	x		x	x	x		x●	x●	x
11	WAG	x	x	x●	x●	x			●	x●	●	x●	●				●	
12	OFF 10	x		x	x					x								
13	790 (BOULDER ALLEY)	x	x	x	x					x		x	x					
14	SWEET KNEES	x	x	x	x													
15	761 (PHILOSOPHY)	x	x	x	x					x								
16	79-S-24 (COO 5)	x		x	x				x	x	x	x	x			x	x	
17	COO 7 NORTH (KUWAIT)	x		x	x					x		x						
18	COO 7 SOUTH (SUICIDE)	■		x	x					x		x						
19	79-S-2 (COMMANDO)	x	x							x		x	x					
20	LUCKY 13			x						x		x					x	
21	GRANITE	x■	x	x	x■	x		x	■	x●		xo	xo	■		o	x■	
22	LONE GULL	x●		x	x■		x		x■	x●		x●	x	x■		x■	x■	
23	THELON		x	x														
24	AREA 27	x	x	x	x	■				x		x	x					
25	AREA 25	x	x	x	x●				●	x	x	x	x			x		
26	BOUNDARY						x										x	
27	RD 9	x		x	x					x		x	x					
28	RD 8	x		x	x	x						x	x					
29	562-563	x	x	x	x													
30	79-S-4 (ORANGETANG)	x	x						■	x		x	x					
31	BS	x	x		x					x	x	x	x	x		x		
32	END																	
33	SLEEK LAKE				x													
34	ROUGHLAND																	
35	AREA 8			x														
36	CARIBOU		x●	x			x										x	
37	BASEBALL	x			x					x								
38	NSFZ	x	x	x	x					x		x	x	x				
39	RANGER									x								
40	FOX	x	x	x	x	x	x			x		x	x	x		x	x	
41	BAR 3	x	x	x	x					x		x						
42	KILLER RABBIT	x	x	x	x					x		x	x					
43	AREA 31	x	x	x	x					x		x	x			x		
44	AREA 29	x	x	x	x					x		x	x					
45	AREA 45	x	x	x	x					x	x	x	x			x		
46	SQUARE LAKE	x	x	x	x		x		x	x	x	x	x	x		x	x	
47	AB	xo		x	xo	x	x	o		xo	x	xo	xo	x		x	x	
48	RD 3	x	x■	x	x	x			●	x		xo	●				■	
49	RD 2	x		x	x	x			x	x		x	x					
50	79-S-16 (LA 4)	xo	x■	x■	o				x■	xo	x	xo	xo	x		x■	x	x
51	RD 6 (LA 12)	x		x	x					x		x						
B	PL/23	●	●	●	●				●	●	●	●	●			●		
C	"83"	o	o	o	o				o									
D	S 1	o	o	o	o				o			o						
E	RD 4	o	■	■	■		o		■	●	o	■	■			o	■	
F	RD 7	o	o	o						o		o						

FIGURE 5-13: Project K-1 grid surveys.

DIAND assessment report: 081733.

PROPERTY

MARJ 1-11 66 B/3,5,6

LOCATION

The claims are north of Marjorie Lake and south of Aberdeen Lake (Fig. 5-12).

HISTORY

Claims MARJ 1-11 were staked in 1983 and cover ground held by Urangesellschaft Canada Ltd. as Prospecting Permit 354 and the BA and MAJ claims between 1975 and 1982. Exploration of the Marjorie-Aberdeen Project between 1975 and 1982 included airborne and ground geophysical surveys, geochemical surveys and geological mapping. Fracture-related uranium concentrations on the AB claims, southeast of the MARJ claims, were drilled in 1982 with discouraging results (Laporte, 1978, 1979, 1983a, c, 1984).

DESCRIPTION

Archean or early Proterozoic granite, gneissic granite and granitic augen gneiss underlie the southern part of the claims. This granitic complex is overlain to the north and west by acid volcanics and subvolcanic intrusions, arkose and conglomerate of the Pitz and Kunwak Formations. Sandstone of the Thelon Formation overlies these rocks in the northern half of the claims.

CURRENT WORK AND RESULTS

Reconnaissance geological mapping, prospecting and lake sediment sampling of the Marjorie Lake-Princess Mary Lake area in 1983 resulted in the discovery of several phosphatic uranium concentrations in Thelon Formation sandstone and the subsequent staking of the MARJ claims. A grid was constructed along the unconformity on the MARJ claims and explored with detailed geological mapping, boulder prospecting, magnetometer, EM-16, EM-16R and scintillometer surveys and overburden sampling.

PROJECT DUBAWNT

Westmin Resources Ltd. Uranium
25 Adelaide St., E 66 B,C,G,H
Toronto, Ont., M5C 1Y2

REFERENCES

Laporte (1978, 1979, 1983a, c, 1984); LeCheminant and others (1984); Tella and Heywood (1983); Tella and others (1983, 1984); Wright (1967).

DIAND assessment reports: 081569, 081571, 081573, 081581, 081596, 081599, 081600, 081612.

PROPERTY

The properties explored are listed in Figure 5-14.

LOCATION

The project extends southwest from Amer Lake to north of Aberdeen Lake (Fig. 5-14).

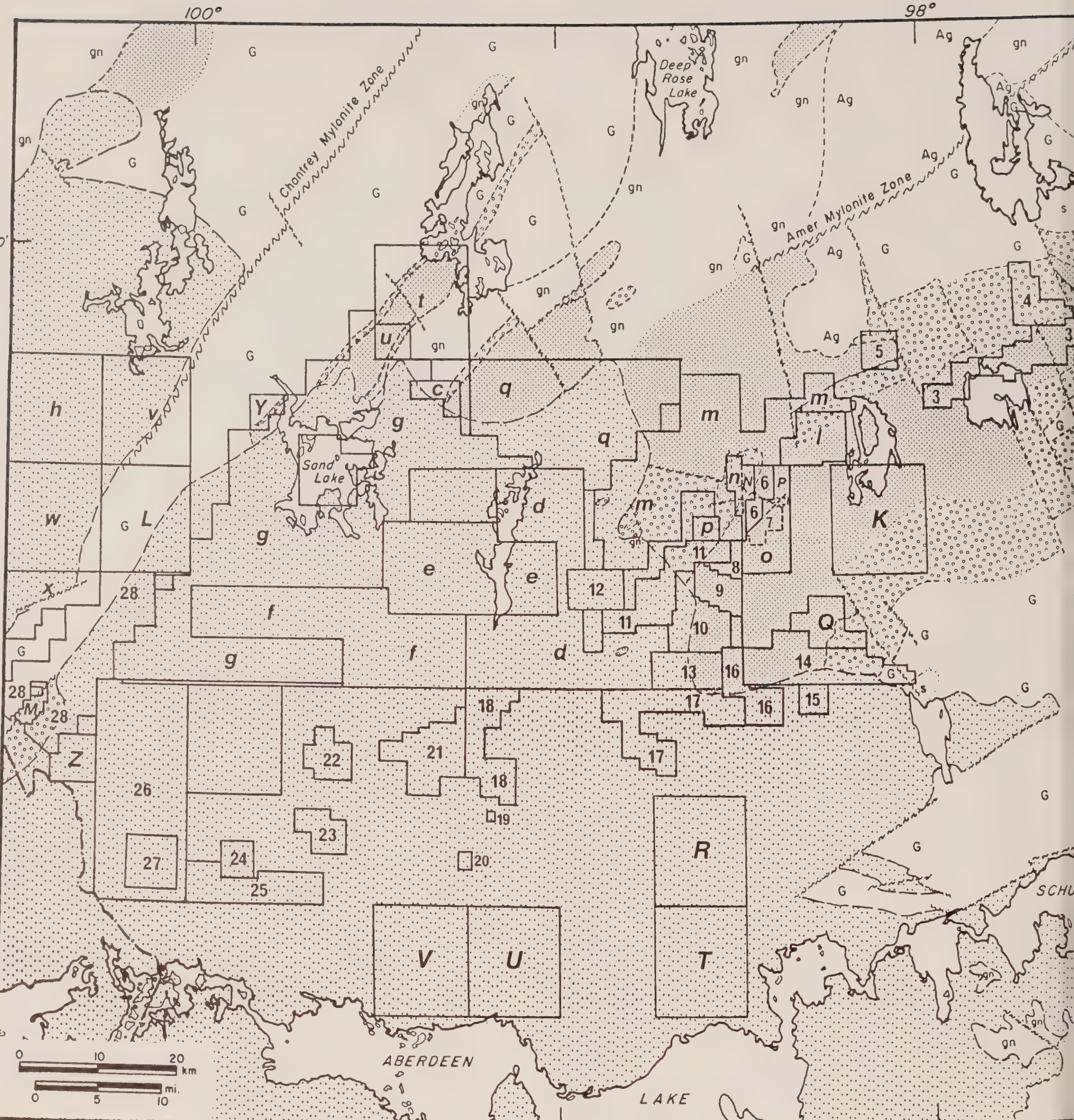
HISTORY

Westmin Resources Ltd. and its precursors have been exploring the project area since 1976 when Prospecting Permits 425 to 427 and the U 1-159 claims were acquired. Prospecting Permit 466 and the AZW 1-30, CAN 1-178, 97 CHE, LIK 1-99, NOR 1-165 and TIB 1-196 claims were acquired in 1977. Prospecting Permits 468, 469, 537 to 542 and the UM 1-8 and WGE 1-4 claims were acquired in 1978. Claims EH, GALLIUM 1-6, GC 1-2, GSE 1-2, LA 1, LAPLAND, LONGSPUR, TERN and WES 1-12 were added in 1979 and another 95 claims in 1980. Prospecting Permits 425 to 427 and 466 expired in 1980, Prospecting Permits 468 and 469 in 1981 and Prospecting Permits 537 to 542 in early 1982. In 1980 and 1981, 126 claims were allowed to lapse. More claims lapsed in 1982 and 1983 (Fig. 5-14).

Geological and geochemical surveys done in 1976 and 1977 led to the discovery of a number of uranium concentrations in Amer Group sediments, one of which was probed with 7 Winkie drill holes (Laporte, 1978, 1979). Geochemical, airborne geophysical and geological work further to the southwest in 1978 and 1979 outlined 14 areas of anomalies requiring follow-up surveys (Laporte, 1983a, c). Seven of these areas were explored with ground surveys in 1980 and 13 holes totalling 1855 m were drilled to obtain stratigraphic information about the Thelon Formation. Detailed airborne geophysical surveys and geochemical surveys were done in 1981. Anomalies detected were prospected (Laporte, 1984).

DESCRIPTION

A 20- to 30-km-wide belt of Aphebian Amer Group orthoquartzite, shale, siltstone, feldspathic sandstone and dolomitic limestone trends southwest in the eastern part of the project area. The sedimentary rocks are flanked by granitic gneisses to the northwest and southeast and are overlain to the southwest by sandstone and pebbly sandstone of the Helikian Thelon Formation.



WESTMIN RESOURCES LTD.

1. AZW 14-30*
2. OORA 1-2
3. FENIX 1; MAR 1-18*
4. RAD 1-8
5. EH; LONGSPUR
6. MO 1-2
7. OBOE 1-3*
8. GALLIUM 1-6
9. U 1-159*
10. WES 1-6, 9-12*
11. UM 1-7
12. NOR 1-165°
13. WGE 1-4
14. ITZA 1-11
15. RN 1-2
16. CAN 1-178
17. EXT 1-10°
18. GMF 1-9
19. GMF 10
20. GMF 11
21. AES 1-11
22. GRACE 1-3; SARA 1
23. STEPH 1-4
24. LIK 1-99
25. HELEN 1-9*°
26. AUG 1-41*°
27. TIB 1-196*
28. UP 1-21*

AQUITAINE COMPANY OF CANADA LTD.

a. 14 BAW°; BRO 1-17°; PRO 1-36°
b. ADD 1-15*°; 3 BRE; BRI 1-2; 6 BRU; BRY 1-6

c. JO 18, 19* - BP MINERALS LTD.

CANADIAN NICKEL COMPANY LTD.

d. TM 1-20, 22-35*
e. KS 1-26*°
f. JM 1-17, 20-23, 28-31, 36-39*°

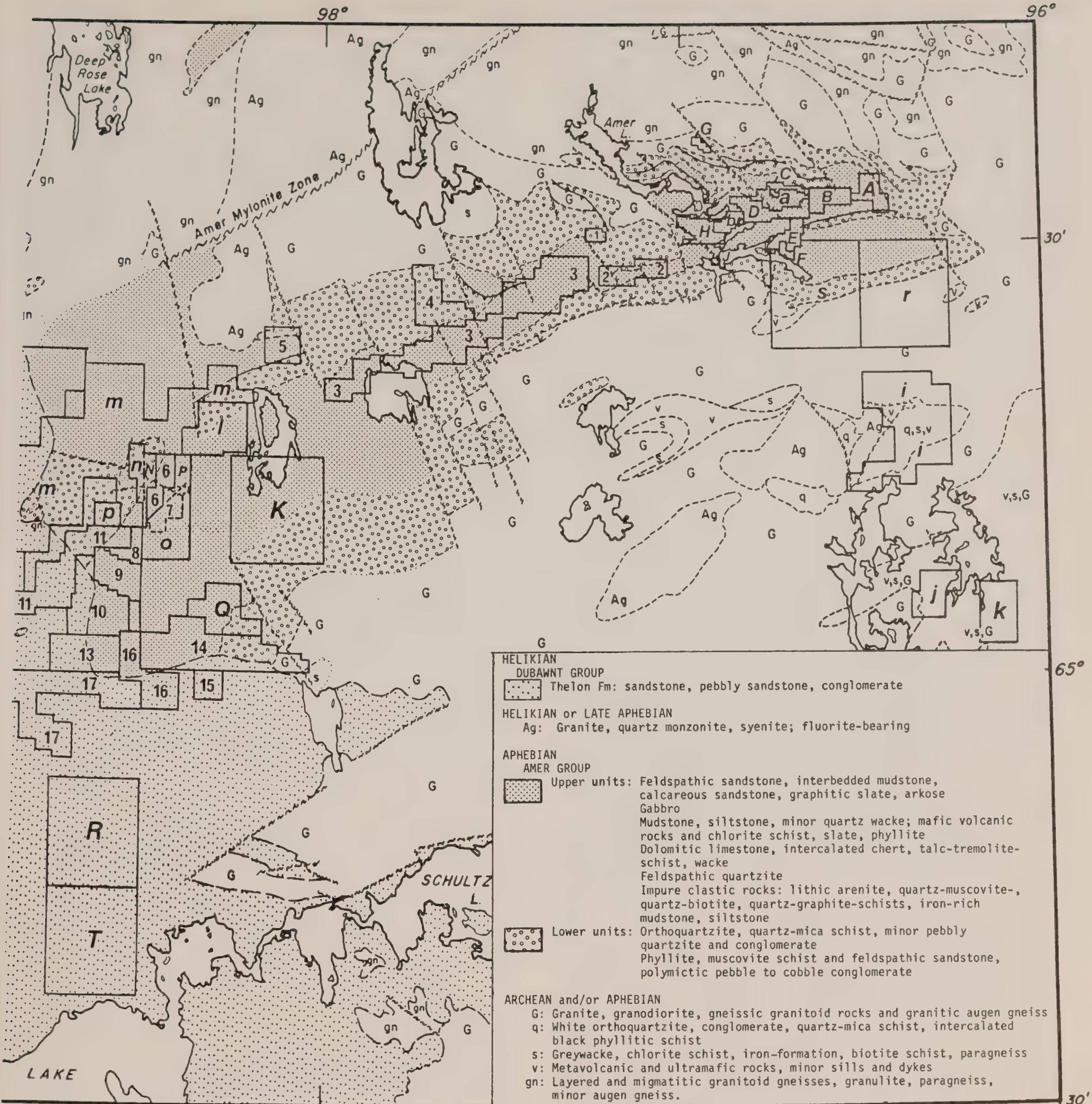
g. SAN 1-96*° - MOBIL ENERGY MINERALS LTD.

h. Prosp. Perm. 724° - KIDD CREEK MINES LTD.

i. SYL 1-13 - ESSEX MINERALS COMPANY

j. MOON 1-2 - COMAPLEX RESOURCES INTERNATIONAL LTD.

FIGURE 5-14: Geology and properties, Amer and Sand Lakes area (Geology from Donaldson, 1966; LeCheminant and



k. HI 1-4*
l. IRMA 1-3; SH 1-130

URANGESELLSCHAFT CANADA LTD.

m. 37 SAN*°
n. DIANA 1-6
o. KB 1-8
p. SHW 1-64
q. DR 1-40*

r. Prosp. Perm. 664°
s. Prosp. Perm. 663°

UNION OIL COMPANY OF CANADA LTD.

t. Prosp. Perm. 782
u. SAND 1-2
v. Prosp. Perm. 660°
x. Prosp. Perm. 658°
y. SAVAGE 1-14*°

URANERZ EXPLORATION AND MINING LTD.

A. ERZ 121-147; PYT; SHA
B. BON 1-55; JNS 1-8
C. NIP 85-103
D. ERZ 58-95; GRG 1-7; NIP 29-84
E. BON 56-97; JUD 1-12
F. ERZ 96-107
G. ERZ 46-57
H. ERZ 1-45; NIP 1-28
J. SKR 1-4
K. Prosp. Perm. 758
L. Prosp. Perm. 757
M. URA 65-116°

N. GO 1, 3*
P. GO 2*
Q. CHRIS 1-8*

HUDSON'S BAY OIL AND GAS LTD.

R. Prosp. Perm. 721°
T. Prosp. Perm. 718°
U. Prosp. Perm. 720°
V. Prosp. Perm. 719°
W. DRUM 1-3
Y. Prosp. Perm. 756°
Z. TIB 1-4, 7

* partly or totally lapsed in 1982
° partly or totally lapsed in 1983

others, 1984; Tella and Heywood, 1983; Tella and others, 1983 and 1984).

Three types of uranium occurrences have been detected: unconformity vein-type, syngenetic, and sandstone-hosted. The unconformity vein-type showings are narrow stockwork fractures with chlorite, calcite, hematite, kaolinite and quartz in feldspathic quartzite of the Amer Group. Samples of boulders from the RAD claims contain up to 1.6% U_3O_8, but average 0.1% U_3O_8. The syngenetic showings are pore fillings of pitchblende, chalcopyrite, pyrite, magnetite and calcite in sandy interlayers in siltstone of the Amer Group. Grab samples contain up to 2.71% U_3O_8, but these showings generally contain 0.05% U_3O_8 over 2 to 2.5 m width. The sandstone-hosted deposits contain up to 0.1% U_3O_8 associated with various amounts of phosphate. In one area, uranium-bearing breccia zones up to 300 m long occur in the Thelon Formation sandstone.

CURRENT WORK AND RESULTS

Detailed geological, geochemical and geophysical surveys were done in 7 areas in 1982. In Area 2 (ITZA 2 to 4), the grid was extended and a small grid established over an airborne anomaly to the southwest. Both grids were prospected and surveyed with scintillometers. Parts of the main grid were also explored with VLF-EM, IP and magnetometer surveys and a 307-site radon-in-soil survey.

In Area 3, work was done on the R46A anomaly (UM 1 and GALLIUM 1 to 4) and the SN 176 area (UM 6 and WES 4 and 12). The grid on R46A was extended and explored with VLF-EM, magnetometer, IP, radiometric and radon-in-soil surveys. The 531 Track Etch cups collected in 1982 outlined 6 anomalies. The radon survey outlined two anomalies near VLF-EM conductors. In the SN 176 area, geomorphological studies, mapping, prospecting, magnetometer, VLF-EM and IP surveys were done and 853 Track Etch cups planted in 1981 were collected. The radon concentration of the soil was measured at 958 sites. Some of the conductors and low resistivity zones outlined are associated with Track Etch anomalies.

Prospecting of Area 7 (GRACE claims) resulted in the discovery of 4 types of radioactive Thelon Formation sandstone boulders. Uranium occurs in the apatite cement of some boulders, the quartz cement of others, along fractures in a third type and in the pores and clay matrix of the fourth type of boulders. Radioactive phosphatic and porous sandstone boulders also occur in two trains in Area 8 (AES and GMF claims). Very detailed lake geochemical surveys of two lakes in Area 8 as well as underwater radiometric surveys, prospecting and VLF-EM surveys indicate that the anomalous uranium and helium concentrations in the lakes are derived from underneath the lakes and not from surface run-off.

The other 2 areas surveyed are the RAD 1 to 3 claims and the R22 area on the EH and LONGSPUR claims. Radon concentrations in soils were measured at 2500 sites on the RAD claims and 1,141 of the 1,176 Track Etch cups planted in 1981 were recovered. As well, prospecting, IP and VLF-EM surveys and geomorphological mapping were done. Similar surveys were done in the R22 area where 4 boulder trains of radioactive Amer Group sediments were outlined. The boulders consist of feldspathic sandstone with syngenetic uranium concentrations and one train consists of quartzite with epigenetic uranium concentrations in fractures.

VWX PROJECT

Anaconda Canada Explorations Ltd.	Uranium, Gold
1600, 1500 West Georgia St.	66 B/1,2,7,8
Vancouver, B.C., V6G 2Z6	64°15'N,98°30'W

REFERENCES

Donaldson (1969); Laporte (1983c, 1984); LeCheminant and others (1983).

DIAND assessment report: 081607.

PROPERTY

The properties explored are listed in Figure 5-12.

LOCATION

The claims extend from the southeast corner of Aberdeen Lake to the north shore of Mallery Lake (Fig. 5-12).

HISTORY

The V and W claims were acquired by Marline Oil Corporation Ltd. in 1978, the VW claims were added in 1979 and the XW claims in 1980. Exploration in 1979, 1980 and 1981 involved airborne geophysical surveys, reconnaissance geochemical surveys, geological mapping and ground geophysical and geochemical surveys of anomalies and the drilling of 18 holes totalling 2980 m (Laporte, 1983c, 1984). Anaconda Canada Exploration Ltd. became part owners and operators of the project in 1982. The CH claims were staked in 1982 and 12 of the XW 5-23 claims lapsed in 1983.

DESCRIPTION

The northern claims are underlain by sandstones of the Helikian Thelon Formation. The regolith developed below the sandstone is locally radioactive. A belt of Archean and/or early Proterozoic metagreywacke, biotite quartzite, schist, iron-formation and dolomite trends east-northeast in the centre of the claims and underlies the Thelon Formation. Layered gneisses and granite outcrop on the southern claims.

Four showings were drilled in 1980 and 1981, but no economic uranium concentrations were detected. One hole on the Karl Showing cut hematite-quartz iron-formation containing 9.58 ppm Au over 0.86 m. Holes on the Norm, Sandbould and W-2 Showings intersected zones of alteration and brecciation in the granitic gneiss and overlying regolith which enclose minor phosphate and uranium concentrations.

CURRENT WORK AND RESULTS

Geological mapping and prospecting at 1:20,000, detailed surveys on 3 main grids and 7 smaller grids, and the drilling of 24 holes totalling 2,328 m were used to explore the claims in 1982. During the regional mapping, the Aphebian basement was subdivided into:

- foliated quartz-feldspar-biotite gneiss (youngest);
- quartz-feldspar-biotite schist and quartz-biotite schist;
- banded iron-formation including hematite iron-formation, graphite-sericite-pyrite schist, quartzite, quartz-feldspar-garnet-chlorite schist and amphibolite;
- quartz-feldspar schist; and,
- quartz-feldspar-biotite-hornblende gneiss (oldest).

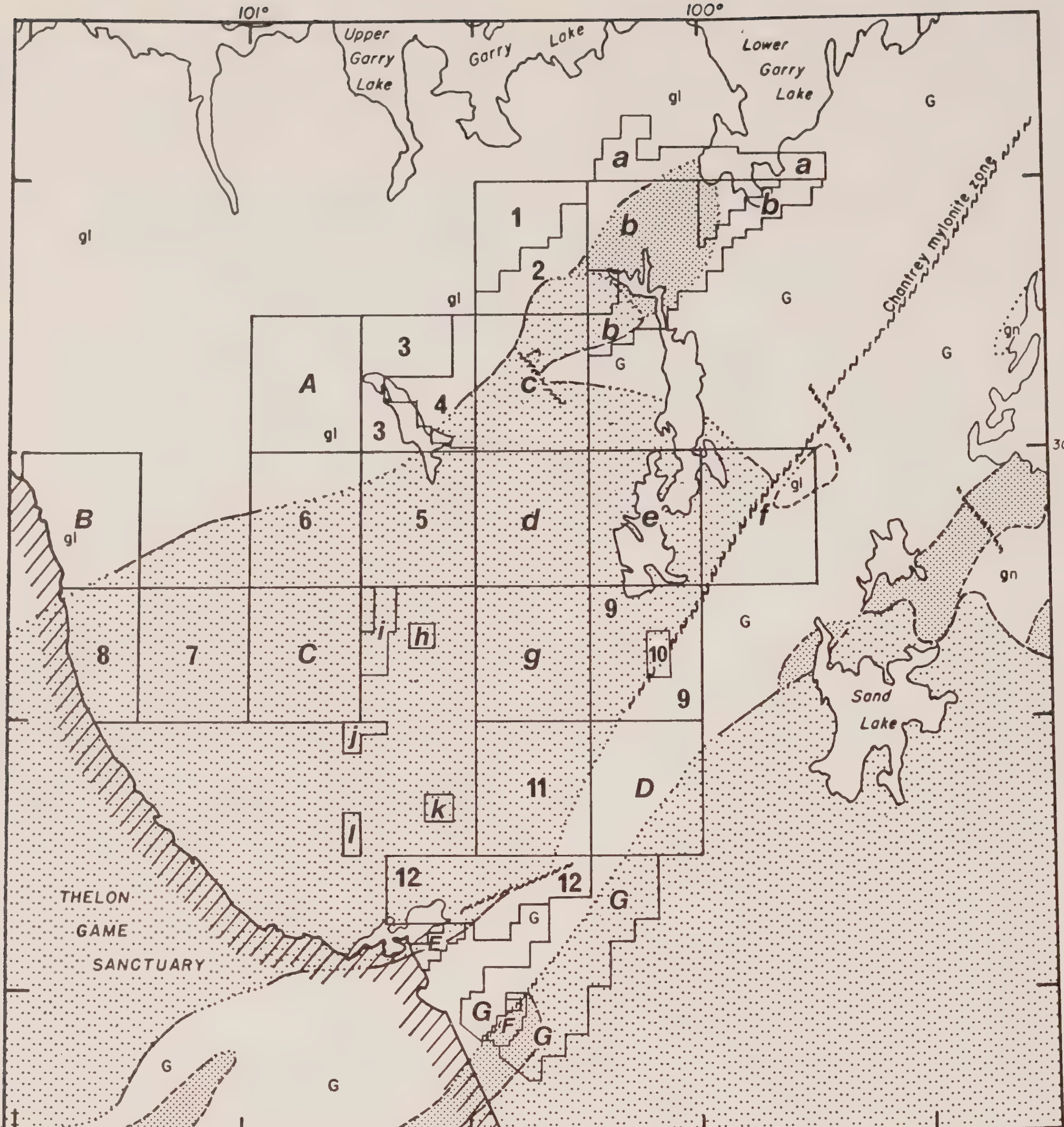
These rocks are intruded and hydrothermally altered by fluorite-bearing granite at the Stan, Ryan and XW-7 Showings.

Nineteen of the 24 holes were drilled on the Karl grid (VW 4 and W 1-4 claims) which was also explored with a 360-site frost boil and till geochemical survey, a 360-site radon and thoron in soil survey, geological mapping at 1:5,000 and VLF-EM, HLEM and magnetometer surveys. Most of the 16 holes drilled in the southern part of the grid to test a 3.5-km length of iron-formation and geochemical or geophysical anomalies contain anomalous gold concentrations over 1 to 27 m thickness. The gold content of the iron-formation and cross-cutting breccia zones ranges up to 2,730 ppb Au over 0.9 m; 7.92 m of core contained 300 ppb Au. The 7 other holes were drilled on the northern part of the grid to test graphitic conductors extending under the Thelon Formation regolith. No gold or uranium concentrations were detected.

The Norm (claim W 23) and Sandbould (claim W 21) Showings were also explored with geophysical surveys, Track Etch surveys and diamond drilling. Two holes drilled to test separate IP and EM anomalies on the Norm Showing intersected barren fractures and breccias in the regolith and basement schists. The hole on the other showing tested a radon anomaly over a VLF conductor, but did not encounter any uranium concentration.

Seven new grids were set up; 4 on INPUT conductors at or near the unconformity on claims W 5 and 6, W 7, W 11 and W 19, and 1 each on the newly-discovered Stan (claims W 23 and XW 24), Ryan (claim XW 22) and XW 7 (claim XW 7) Showings. Only weak conductors were detected during HLEM, VLF-EM and magnetometer surveys of the INPUT anomalies. One hole on claim W 7 intersected hematized chlorite schist without uranium concentrations.

Mapping, VLF-EM, magnetometer and IP surveys were done on the Stan Showing to outline the extent of quartz-pyrite veins found at the metasediment-granite contact. The veins contain minor amounts of fluorite, chalcopyrite, galena, scheelite and possibly native silver. One hole drilled to test a magnetic and resistivity low at the intersection of 2 conductors cut altered gneiss but no economic mineral concentrations. The Ryan Showing is a series of boulder trains of highly altered and sheared gold- and silver-bearing pyritiferous granite. Samples from the boulders which also contain galena, chalcopyrite, sphalerite and possibly enargite contained up to 6,070 ppb Au. VLF-EM surveys outlined 5 conductors, at least 2 of which have coincident resistivity low and chargeability high IP anomalies. The XW 7 Showing is a boulder train of auriferous quartz-pyrite boulders in an area of quartz-feldspar-biotite gneiss outcrops. Eleven boulders contained an average of 986 ppb Au with one boulder containing 6,280 ppb Au.



HELIKIAN
DUBAWNT GROUP
Thelon Formation: sandstone, pebbly sandstone and conglomerate

APHEBIAN
AMER GROUP: orthoquartzite, dolomitic limestone, mudstone-siltstone, feldspathic sandstone and arkose

APHEBIAN and/or ARCHEAN
G: Granite, massive to weakly foliated, mafic-poor
gn: Hornblende-biotite granite, granodiorite: well-foliated, contains inclusions of gneiss, migmatite, amphibolite and gabbro
gl: Garry Lake Complex: Layered gneiss complex of quartz-feldspar-biotite gneiss, augen gneiss, granodiorite, tonalite and granite gneiss

KIDD CREEK MINES LTD.
a. RAY 1-10°
b. GAR 1-30°
c. Prosp. Perm. 649°, LAK 1-15
d. Prosp. Perm. 648°
e. Prosp. Perm. 647°
f. Prosp. Perm. 650°
g. Prosp. Perm. 724°
h. CON 7°
i. CON 5-6°
j. CON 3-4
k. CON 2
l. CON 1

UNION OIL COMPANY OF CANADA LTD.
Drift Lake West Project
1. Prosp. Perm. 661°
2. SHERYL 1-9
3. Prosp. Perm. 662°
4. DRIFT 1-7
5. Prosp. Perm. 781°
6. Prosp. Perm. 659°
7. Prosp. Perm. 779°
8. Prosp. Perm. 780°
Drift Lake East Project
9. Prosp. Perm. 660°
10. SMLE 1
11. Prosp. Perm. 658°
12. SAVAGE 1-14*°

URANERZ EXPLORATION AND MINING LTD.
A. Prosp. Perm. 825
B. Prosp. Perm. 823
C. Prosp. Perm. 824
D. Prosp. Perm. 757
E. URA 1-64°
F. URA 65-116°

G. UP 1-21° - WESTMIN RESOURCES LTD.

* partly or totally lapsed in 1982. ° partly or totally lapsed in 1983

FIGURE 5-15: Geology and properties, Sand and Garry Lakes area (Geology from LeCheminant and others, 1984).

UP CLAIMS

Westmin Resources Ltd. — Uranium
25 Adelaide St., E — 66 C/16; F/1
Toronto, Ont., M5C 1Y2 — $65^{o}00'N,100^{o}15'W$

REFERENCES

Laporte (1984); LeCheminant and others (1984); Tella and others (1984).

DIAND assessment report: 081597.

PROPERTY

UP 1-22 — 66 C/16;F/1

LOCATION

The claims are north of Beverly Lake and southwest of Sand Lake (Fig. 5-15).

HISTORY

Claims UP 1-22 were staked in June, 1980 for Seru Nucleaire (Canada) Ltd. who explored the property with INPUT and helicopter-borne scintillometer surveys, geochemical lake water and sediment and soil surveys, mapping and prospecting. In 1981 a grid established on an INPUT conductor was tested with prospecting, a detailed geochemical lake water and sediment survey, mapping, magnetometer, resistivity, VLF-EM and gravity surveys, radon-in-soil and frost boil geochemical surveys (Laporte, 1984). The UP 16-21 claims were transferred to Westmin Resources Ltd. and the UP 1-15 and 22 claims allowed to lapse in 1982.

DESCRIPTION

The north shore of Beverly Lake is underlain by Helikian Thelon Formation sandstone. The unconformity between the sandstone and the granitic basement complex trends northeast from north of Beverly Lake across the UP claims to northwest of Sand Lake. A belt of Amer Group sediments outcrops at the unconformity on the claims.

CURRENT WORK AND RESULTS

In 1982, a Westmin Resources Ltd. crew established grid lines intermediate to the existing lines and surveyed them with MaxMin HLEM and VLF-EM. Geological mapping and a 833-site radon-in-soil survey were also done. The main radon anomaly flanks and in part coincides with the main EM conductor. A second anomaly was outlined on the same conductor and a third on a different conductor.

PROSPECTING PERMIT 757

Uranerz Exploration and Mining Ltd. — Uranium
204, 229 - 4th Ave., SW — 66 F/1
Saskatoon, Sask., S7K 4K3 — $65^{o}17'N,100^{o}08'W$

REFERENCES

Laporte (1974a, 1979, 1981, 1983a, 1984); LeCheminant and others (1984); Tella and others (1984).

DIAND assessment report: 081590.

PROPERTY

Prospecting Permit 757 — 66 F/1 NE

LOCATION

The permit area is west of Sand Lake (Fig. 5-15).

HISTORY

The permit, acquired in 1981, covers part of the area previously held by Abidonne Oils Ltd. as Prospecting Permit 100 in 1969 and by Uranerz Exploration and Mining Ltd. as Prospecting Permit 396 from 1976 to 1979. Radiometric and magnetic surveys flown in 1969 did not detect interesting anomalies (Laporte, 1974a). Geochemical lake water and sediment surveys, airborne surveys and geological mapping were used to explore the permit area in 1976 to 1978 (Laporte, 1979, 1981, 1983a). The area was mapped and prospected in 1981.

DESCRIPTION

The permit covers part of a southwest-trending, 8- to 13-km-wide area of massive to weakly foliated granite overlain to the northwest and southeast by sandstones of the Thelon Formation.

CURRENT WORK AND RESULTS

A 276 line-km INPUT survey and a 240 line-km VLF-EM and radiometric survey flown in 1982 outlined 3 weak INPUT conductors and 7 weak radiometric anomalies. A 13-sample lake sediment survey outlined some base metal anomalies. No showings were discovered during geological mapping and prospecting of the area. The results of ground surveys done in 1983 were not reported.

DRIFT LAKE EAST PROJECT

Union Oil Company of Canada Ltd. — Uranium
335 - 8th Ave., SW — 66 F/1,2,8
Calgary, Alta., M5K 2K6 — 65°13'N,100°20'W

REFERENCES

Laporte (1984); LeCheminant and others (1984); Tella and others (1984).

DIAND assessment report: 081411

PROPERTY

Prospecting Permit 658	66 F/1 NW
SAVAGE 1-14	66 F/1,2
Prospecting Permit 660, SMLE	66 F/8 SE

LOCATION

The properties are west of Sand Lake (Fig. 5-15).

HISTORY

The two permits were acquired in early 1980 and the SAVAGE claims were staked in August. A lake sediment and water geochemical survey in 1980 was followed by a helicopter-borne VLF-EM and radiometric survey in 1981. An INPUT and magnetometer survey was also flown on the SAVAGE claims in 1981. Detailed geochemical surveys and prospecting indicated that most of the radiometric and geochemical anomalies are caused by uranium and phosphate concentrations in the Thelon Formation.

The SMLE claim was staked in 1982 and the permits lapsed in 1983. The SAVAGE claims lapsed in 1982 and 1983.

DESCRIPTION

The permits and claims cover the southeastern edge of a northeast-trending basin of Thelon Formation sandstone and conglomerate. The Helikian clastic rocks unconformably overlie massive to weakly foliated granite of Archean or Aphebian age.

CURRENT WORK AND RESULTS

A 36-site geochemical lake water and sediment survey and prospecting were used in 1982 to explore a geochemical anomaly detected in 1980 on Prospecting Permit 660. The anomaly was confirmed but remains unexplained. The SAVAGE claims and some radiometric anomalies on Prospecting Permit 658 were prospected.

PROSPECTING PERMIT 823

Uranerz Exploration and Mining Ltd. — Uranium
204, 229 - 4th Ave., SW — 66 F/6
Saskatoon, Sask., S7K 4K3 — 65°26'N,101°22'W

REFERENCES

Laporte (1981, 1983a); LeCheminant and others (1984).

DIAND assessment report: 081588.

PROPERTY

Prospecting Permit 823	66 F/6 NW

LOCATION

The permit is west-northwest of Sand Lake (Fig. 5-15).

HISTORY

The permit was acquired in 1982 and covers ground held by Uranerz Exploration and Mining Ltd. as Prospecting Permit 445 from 1977 to 1980. Geochemical, geophysical and geological surveys along the sub-Thelon Formation unconformity in 1977 and 1978 failed to outline uranium concentrations of interest (Laporte 1981, 1983a).

DESCRIPTION

The unconformity between Thelon Formation sandstone and the layered and migmatitic gneisses of the basement complex trends northeast in the southeastern corner of the permit area.

CURRENT WORK AND RESULTS

Reconnaissance geological mapping, prospecting, a 45-sample lake sediment survey, 72.25 line-km of INPUT along lines at 2 km spacing and 216 line-km of VLF-EM and radiometric surveys flown along lines at 1 km spacing were used to explore the permit in 1982. Five lake sediment samples enriched in uranium, 4 weak INPUT responses and 53 radiometric anomalies were detected. The radiometric anomalies were investigated and correspond to drift/outcrop or drift/boulder field contrasts.

A 10-man crew investigated anomalies on the prospecting permit in 1983 but the result of this work was not reported.

PROSPECTING PERMIT 824

Uranerz Exploration and Mining Ltd.	Uranium
204, 229 - 4th Ave., SW	66 F/7
Saskatoon, Sask., S7K 4K3	65°18'N,100°53°W

REFERENCES

LeCheminant and others (1984).

DIAND assessment report: 081592

PROPERTY

Prospecting Permit 824	66 F/7 SW

LOCATION

The permit is west of Sand Lake (Fig. 5-15)

HISTORY

Prospecting Permit 824 was acquired in 1982.

DESCRIPTION

Sandstone of the Thelon Formation underlies the area.

CURRENT WORK AND RESULTS

Geological mapping and prospecting, a 49-sample lake sediment survey, 264 line-km of INPUT along lines at 800 m spacing and 177 line-km of VLF-EM and radiometric surveys were done on the permit area in 1982. Four INPUT anomalies were detected, but no geochemical anomalies.

The results of ground surveys done in 1983 were not reported.

DRIFT LAKE WEST PROJECT

Union Oil Company of Canada Ltd.	Uranium
335 - 8th Ave., SW	66 F/6,7,9,10
Calgary, Alta., T2P 2K6	65°33'N,100°37'W

REFERENCES

Laporte (1979, 1981, 1983a, 1984); LeCheminant and others (1984).

DIAND assessment report: 081411.

PROPERTY

Prospecting Permits 779 and 780	66 F/6 S
Prospecting Permits 659 and 781	66 F/7 N
Prospecting Permit 662, DRIFT 1-7	66 F/9 SE
Prospecting Permit 661, SHERYL 1-9	66 F/10 NW

LOCATION

The properties are west of Sand Lake (Fig. 5-15).

HISTORY

Prospecting Permits 659, 661 and 662 were acquired in 1980 and the others in 1981. The DRIFT and SHERYL claims were staked in 1982. All the prospecting permits expired or were relinquished in 1983.

Parts of the project area were held by Uranerz Exploration and Mining Ltd. in 1976 to 1979 and Essex Minerals Company in 1978. Geochemical, geophysical and geological surveys did not outline interesting concentrations of uranium (Laporte, 1979, 1981, 1983a). In 1980, geochemical anomalies worthy of further study and several small fracture-controlled uranium showings in the basement gneisses were discovered on Prospecting Permits 659 and 662. INPUT surveys in 1981 outlined conductors within the Amer Group sediments but no radioactive boulders were found associated with these anomalies (Laporte, 1984).

DESCRIPTION

The unconformity between Helikian Thelon Formation sandstone and conglomerate and the Archean and Aphebian granitic basement complex trends northeast along the west edge of the properties. Aphebian Amer Group sediments extend southwest under the Thelon Formation on Prospecting Permits 661 and 662.

CURRENT WORK AND RESULTS

Three geochemical anomalies on Prospecting Permits 780 and 781 were prospected in 1982. Twenty-four lakes in the vicinity of the anomaly on Prospecting Permit 781 were resampled but no anomalies were detected.

Three grids were established over INPUT conductors on Prospecting Permits 661 and 662 and explored with prospecting, soil, lake water and sediment surveys and MaxMin EM, VLF-EM and magnetometer surveys. The 934 soil samples collected were analyzed for U, Pb, Ni, As and Po_{210}. Two areas of Prospecting Permit 661 have soil and lake geochemical anomalies overlying conductors.

GARRY LAKES PROJECT

Kidd Creek Mines Ltd.	Uranium
Box 175, Commerce Court West	66 F/8,9,16;
Toronto, Ont., M5L 1E7	G/5,12,13
	65°37'N,100°W

REFERENCES

Laporte (1984); LeCheminant and others (1984); Tella and others (1984).

DIAND assessment reports: 081630, 081640.

PROPERTY

Prospecting Permits 647, 648 and 724	66 F/8
Prospecting Permit 649, LAK 1-15	66 F/9
GAR 1-30	66 F/9; G/12
RAY 1-10	66 F/16; G/13
Prospecting Permit 650	66 G/5 NW

LOCATION

The properties are southwest of Lower Garry Lake and northwest of Sand Lake (Fig. 5-15).

HISTORY

Prospecting Permits 647 to 650 and 724 were acquired in 1980 and expired in 1983. Prospecting Permit 724 was acquired by Hudson's Bay Oil and Gas Company Ltd. and transferred to Kidd Creek Mines Ltd. The GAR and RAY claims were recorded in October and December, 1981. The LAK claims were staked in 1982 and cover the area of Prospecting Permit 649.

VLF-EM and radiometric surveys, geological mapping, prospecting and lake sediment and water surveys were done on the permits in 1980. INPUT and magnetometer surveys and re-sampling of geochemical anomalies were done in 1981. Conductors were explored with ground magnetometer, VLF-EM and HLEM surveys and soil sampling surveys (Laporte, 1984).

DESCRIPTION

Amer Group feldspathic sandstone with interbedded mudstone, calcareous sandstone, graphitic slate and arkose outcrop southwest of Lower Garry Lake and is overlain to the southwest by Thelon Formation sandstone. The Aphebian metasediments are underlain to the east by massive to weakly foliated granite and to the west by layered granitic gneisses of the Garry Lake Complex.

CURRENT WORK AND RESULTS

In 1982, a grid was established on the GAR and RAY claims and part of Prospecting Permit 649 and explored with boulder prospecting, VLF-EM, scintillometer, magnetometer and MaxMin EM surveys, a low-level helicopter-borne radiometric survey and a 174-site soil geochemical survey. Eight holes totalling 1038 m were drilled in 5 sections across the INPUT anomalies along the edges of the basin of Amer Group sediments to test the anomalies and determine the stratigraphy. Graphitic metasediments cause the conductors but do not contain uranium concentrations. A narrow train of radioactive boulders and a corresponding soil geochemical anomaly were traced for 3 km. The boulders of altered (hematite and kaolinite) and fractured arkose contain 0.87 to 25.25% U_3O_8. Some of the boulders also contain copper and molybdenum concentrations.

Three hundred Track Etch cups, buried in 1982, were collected during a brief prospecting program in 1983.

PROSPECTING PERMIT 825

Uranerz Exploration and Mining Ltd.	Uranium
204, 229 - 4th Ave., SW	66 F/10
Saskatoon, Sask., S7K 4K3	65°34°N,100°53'W

REFERENCES

LeCheminant and others (1984).

DIAND assessment report: 081591.

PROPERTY

Prospecting Permit 825	66 F/10 SW

LOCATION

The permit is southwest of Lower Garry Lake (Fig. 5-15).

HISTORY

Prospecting Permit 825 was acquired in 1982.

DESCRIPTION

The permit covers layered and migmatitic granitoid gneisses northwest of their contact with the overlying Thelon Formation sandstone.

CURRENT WORK AND RESULTS

Airborne surveys, 258 line-km of VLF-EM and radiometric at 1 km spacing and 11.25 line-km of INPUT, a lake sediment geochemical survey during which 25 samples were collected, mapping and prospecting were done in 1982. Most of the 32 radiometric anomalies prospected correspond to concentrations of granite and pegmatite boulders. One outcrop of granite gneisses encloses chlorite-rich shear zones; samples of which contained 680 ppm U_3O_8 and 1700 ppm ThO_2. Thirteen samples of lake sediment contained anomalous concentrations of base metals.

The anomalies detected in 1982 were prospected in 1983.

PROSPECTING PERMIT 758

Uranerz Exploration and Mining Ltd.	Uranium
204, 229 - 4th Ave., SW	66 G/1
Saskatoon, Sask., S7K 4K3	65°11'N,98°07'W

REFERENCES

Laporte (1984); Tella and others (1983).

DIAND assessment report: 081589.

PROPERTY

Prospecting Permit 758 — 66 G/1 NE

LOCATION

The permit area is north-northwest of Schultz Lake (Fig. 5-14).

HISTORY

Prospecting Permit 758 was acquired in 1981 and explored with geological mapping and prospecting (Laporte, 1984).

DESCRIPTION

The northwestern half of the permit area is drift covered and the southeastern part is underlain by white orthoquartzite of the Amer Group.

CURRENT WORK AND RESULTS

A 263 line-km INPUT survey flown in 1982 along lines 800 m apart detected one strong conductor in the southeast corner of the permit area. A helicopter-borne VLF-EM and radiometric survey along 285 km of lines 1 km apart detected a few radiometric anomalies but no VLF anomalies. Twenty-six lake sediment samples were collected and the permit area was mapped and prospected. MaxMin EM surveys of the INPUT anomaly detected 1 conductor.

Ground geophysical surveys and prospecting were done in 1983 but the results are unknown.

JM, TM and KS CLAIMS

Canadian Nickel Company Ltd.	Uranium
c/o Inco Metals Company	66 G/2,3,4
Copper Cliff, Ont., POM 1NO	65°05'N,99°15'W

REFERENCES

Laporte (1984); Tella and others (1983, 1984).
DIAND assessment report: 081560.

PROPERTY

TM 1-20, 22-35	66 G/2,3
KS 1-26	66 G/3
JM 1-17, 20-23, 28-31, 36-39	66 G/3,4

LOCATION

The claims extend east from south of Sand Lake across Naujatuuq Lake (Fig. 5-14).

HISTORY

The TM claims were staked in August, 1979, the JM claims in March, 1980, and the KS claims in May, 1980. Claim TM 21 lapsed in 1981 and all but TM 2-7, 15-18, 22 and 31-35 lapsed in 1982. The KS claims lapsed in 1982 and 1983 as did all but the JM 2-5 claims.

Airborne geophysical surveys, geochemical surveys and detailed geological, geochemical and geophysical surveys were used to explore the claims in 1981 and 1982 (Laporte, 1984).

DESCRIPTION

The claims cover the extension of a belt of Aphebian Amer Group metasediments under the Thelon Formation sandstone. The unconformity between the two rock sequences trends northwest in the northeastern corner of the TM claims.

The 1981 program outlined three areas of interest. On grid TM-3, a 3.4-km-long HLEM conductor is believed to correspond to graphitic or sulphide-rich horizons in the basement complex. Short VLF-EM conductors on the grid represent shear zones or surficial features. On the Dop Lake grid (claim TM 34) lake sediment samples containing up to 7260 ppm He were collected. The third target area is the Slingshot Lake grid (claim TM 16) where numerous radioactive sandstone and conglomerate boulders were discovered and a 900-m-long radon anomaly was outlined by an Alphacard survey (Laporte, 1984).

CURRENT WORK AND RESULTS

In 1982, the three grids were explored with lake bottom water and sediment sampling, Alphacard radon-in-soil surveys, refraction seismic, gravity, HLEM and VLF-EM surveys, till sampling and prospecting. On the Dop Lake grid, a 692-site lake geochemical survey outlined good helium, uranium and radon anomalies but the seismic survey indicates depth to basement is greater than 300 m. No gravity, VLF-EM or Alphacard anomalies were detected and the only HLEM anomalies were attributed to conductive lake sediments. On the Slingshot Lake grid, depth to basement is between 100 and 300 m and the Alphacard anomalies appear to be related to boulder concentrations. The basement is less than 30 m deep on the TM-3 grid and 2 Alphacard anomalies were outlined near the main EM conductor.

DEEP ROSE PROJECT

Urangesellschaft Canada Ltd.	Uranium
3100, 2 Bloor St., E	66 G/2,7,8
Toronto, Ont., M4W 1A8	65°12'N,98°55'W

REFERENCES

Laporte (1977, 1978, 1979, 1981, 1983a, c, 1984); Shilts (1984); Taylor (1978); Tella and others

(1983).

DIAND assessment reports: 081598, 081675, 081731.

PROPERTY

The properties explored are listed in Figure 5-14.

LOCATION

The project covers the area east of Sand Lake (Fig. 5-14).

HISTORY

Urangesellschaft Canada Ltd began exploring the area in 1974 when Metallgesellschaft Canada Ltd., an affiliate, acquired Prospecting Permit 326 and 327 covering NTS areas 66 G/1 and 8. Prospecting Permit 356 (66 G/2) was acquired in 1976 as were the SH 1-130 claims. Prospecting Permit 378 (66 G/3) and the SHW 1-64 claims were acquired in 1977. Lake sediment and water geochemical surveys, airborne radiometric surveys, mapping and prospecting led to the discovery of a field of uranium-bearing boulders on the SH claims. A grid established on the claims in 1977 was explored with geological mapping, VLF-EM and IP surveys and A_0 horizon geochemical surveys (Laporte 1977, 1978, 1979, 1981; Taylor 1978).

In 1978, a radiometric, VLF-EM and magnetic survey was flown northwest of the SHW claims and the IRMA 1-3 and SAN 1-49 claims were staked to cover anomalies. A second survey flown in 1979, geological mapping and prospecting led to the discovery of 9 uranium showings, three of which were gridded and explored with one or more of the following surveys: soil sampling, radiometric, magnetometer, VLF-EM and HLEM surveys and geological mapping. Eight holes totalling 924.8 m were drilled to locate the source of the boulders on the SH claims (Laporte, 1983c). The PEG 1-8 claims were added to the property in 1979.

A third VLF-EM, magnetometer and radiometric survey was flown and the DR 1-40 claims were staked in 1980. Four new grids and extensions to 3 of the 1979 grids were established and explored with VLF-EM, magnetometer, HLEM, prospecting, mapping, Alpha Nuclear and Track Etch radon measurements and soil geochemical surveys. Another 5 grids and extensions were established in 1981 and explored as in 1980. Gravity surveys were also done (Laporte, 1984).

The PEG and 13 SAN claims lapsed in 1981, the DR and 2 SAN claims in 1982 and one more SAN claim in 1983. The DIANA 1-6 and KB 1-8 claims were staked in 1983.

DESCRIPTION

The properties cover the unconformable contact between southwest-trending Aphebian Amer Group metasediments and the overlying Helikian Thelon Formation sandstone and conglomerate. The Amer Group rocks include orthoquartzite and quartz-mica schist overlain by feldspathic sandstone with interbedded mudstone, calcareous sandstone, siltstone, graphitic slate and arkose. These rocks are deformed into a series of upright to overturned synclines and anticlines and enclose gabbro sills which outcrop in the southeastern part of the claims.

Taylor (1978) recognized 4 rock types in the area of the uranium showing on the SH claims:

- thin siltstone and mudstone beds interbedded with thin, crenulated hematitic arkosic arenites;
- fine-grained, pink hematitic arkosic arenite with a few thin light green to brown mudstone interbeds;
- dolomitic sandstone with a few pink arkosic sandstone interbeds; and
- grey to black siltstone with a few grey mudstone interbeds and irregular lenses of purple, hematitic, arkosic sandstone containing disseminated magnetite and pyrite.

Uraninite, the major uranium-bearing mineral, occurs near or within magnetite-ilmenite grains and, mainly, as disseminations in the matrix of the interbedded siltstone-arkose layers. Where the clasts are relatively far apart and porosity was sufficient, uraninite is in layers paralleling the outline of the pore or veinlet. Some pitchblende is present as large aggregate massive blebs with random shape in areas of high uraninite concentration. Taylor (1978) attributes the deposition of the uraninite to a low temperature hydrothermal replacement event associated with regional metamorphism. The pitchblende was deposited during local remobilization of the uranium. The 1979 drilling was done along 2 sections 400 m apart and the best intersection was 0.2% U_3O_8 over 0.3 m. Estimated ore reserves on the grid are 900,000 tonnes grading 0.104% U_3O_8.

CURRENT WORK AND RESULTS

Three new grids were established in 1982 and, along with 5 previously established grids, were explored with a number of geochemical and geophysical

surveys. One of the new grids covers trains of pitchblende nuggets and dolomite boulders containing pitchblende, hematite, sulphides and arsenides. Another covers coincident EM and radiometric anomalies detected during the 1980 airborne surveys. On the previously established grids, the ground surveys outlined geochemical anomalies and coincident HLEM conductors displaced along VLF-EM conductive zones. A detailed petrographic analysis of the core from one hole drilled in 1979 was also done.

In 1983, geological and surficial mapping and till sampling was completed over most of the clains. Three trains of radioactive boulders were discovered. Glacial mapping, prospecting and till sampling of the western claims outlined a few geochemical anomalies attributed to uranium-phosphate enrichment in Thelon Formation sandstone boulders.

PROSPECTING PERMIT 782

Union Oil Company of Canada Ltd.	Uranium, Gold
335 - 8th Ave., SW	66 G/6
Calgary, Alta., T2P 2K6	$65^{0}26$'N,$99^{0}23$'W

REFERENCES

Tella and others (1983, 1984).

DIAND assessment report: 081411.

PROPERTY

Prospecting Permit 782, SAND 1-2   66 G/6 NW

LOCATION

The properties are north-northeast of Sand Lake (Fig. 5-14).

HISTORY

The prospecting permit was acquired in 1981 and the claims in August, 1983. The permit was explored in 1981 with an INPUT and magnetometer survey, lake sediment sampling, geological mapping and prospecting.

DESCRIPTION

The permit covers a southwest-trending syncline of Amer Group sediments flanked to the southeast and northwest by a basement complex of well foliated to massive granite, granodiorite and quartz monzonite. Orthoquartzite outcrops on both limbs of the fold and is overlain by mudstone, siltstone and minor quartz wacke. The core of the syncline consists of feldspathic sandstone with interbedded mudstone, calcareous sandstone, siltstone, graphitic slate and arkose. Gabbro sills occur below the feldspathic sandstone on the northwest limb of the syncline.

A sample collected in 1981 from Showing 81-02, a quartz stockwork in Aphebian sediments, contained 6.4 ppm Au.

CURRENT WORK AND RESULTS

Prospecting of Showing 81-02, in 1982, yielded disappointing results with all but one of the grab samples containing less than 75 ppb Au and nil U_3O_8. The only interesting sample contained 330 ppb Au and 3000 ppm U_3O_8. Some lake water and sediment samples from the vicinity of an INPUT conductor were enriched in U.

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CHAPTER 6: SOUTHEAST MACKENZIE DISTRICT

Walter A. Gibbins, District Geologist,
Northern Affairs Program, Yellowknife, NWT.

INTRODUCTION

In 1982-83, the Arctic Islands District Geologist continued to monitor mineral exploration in the southeastern District of Mackenzie. This area includes Paleozoic carbonates of the Great Slave Plain, where lead-zinc is the main exploration target, and part of the Churchill Province of the Precambrian Shield, where uranium has been the principle commodity sought. Relative to 1980-81, the 1982-83 field seasons saw a drastic decrease in uranium exploration in the Western Thelon Plain, the East Arm and Nonacho Lake areas. Lead-zinc exploration in the Great Slave Plain was also reduced as exploration was focused mainly in areas of previously discovered deposits. In contrast, there was increased exploration for base and precious metal deposits in the Churchill Province and a continued strong exploration effort at Highwood Resources Ltd.'s niobium-tantalum-beryllium-rare earth deposits in the Blatchford Lake Complex.

THE WESTERN THELON PLAIN

The Western Thelon Plain includes most of the Thelon River drainage basin within the eastern District of Mackenzie and corresponds to the southwestern half of the Thelon Basin (Fig. 6-1). The northern part of this area lies within the Thelon Game Sanctuary, where mineral exploration is not permitted. The southern part, which is extensively covered by glacial deposits (Craig, 1964) has been intermittently explored for uranium since 1969 (Laporte, 1974a).

The Dubawnt Basin is a large, structural-sedimentary basin defined by the various units of the Helikian (Middle Proterozoic) Dubawnt Group, (Curtis and Miller, 1979). In the Western Thelon Plain, the lower and middle units of the Dubawnt Group are absent, and the Thelon Basin is characterized by sparse flat-lying outcrops of the Thelon Formation,

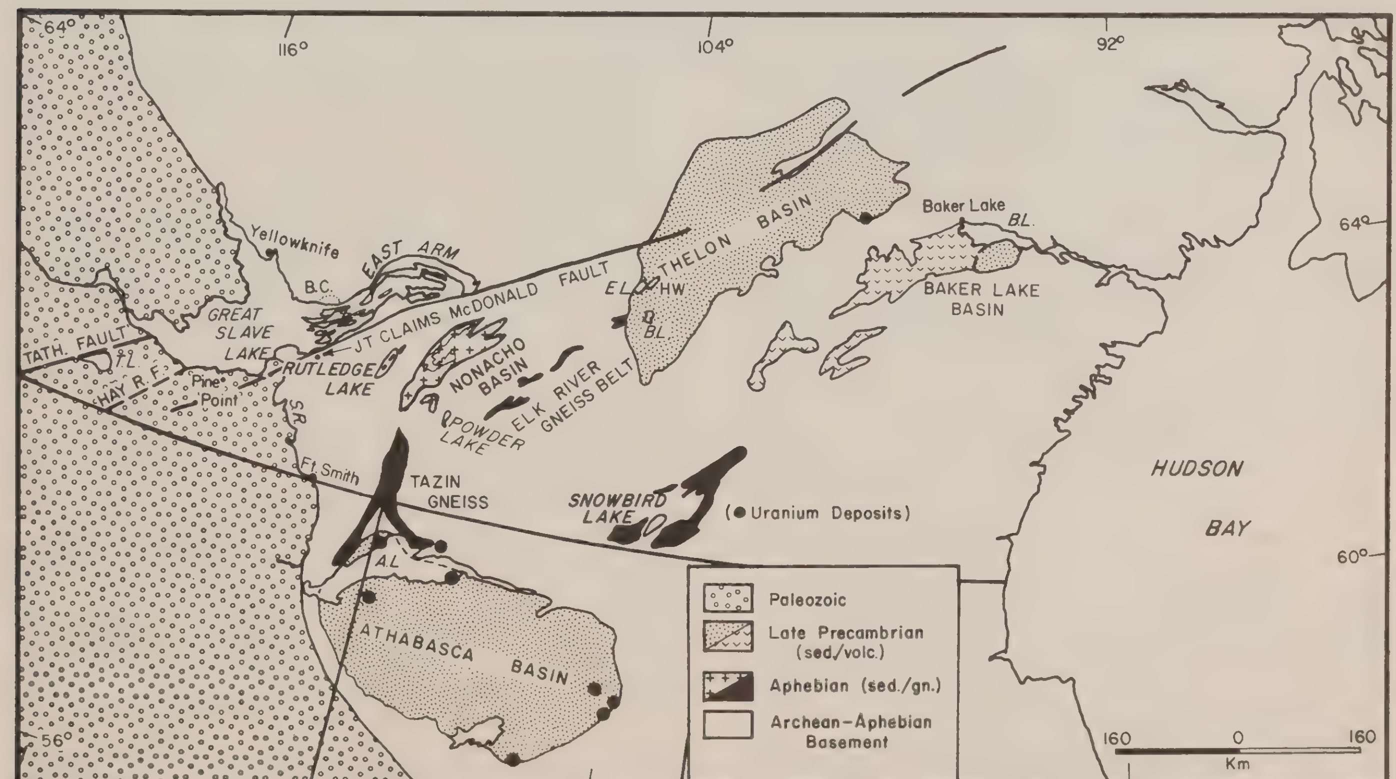


FIGURE 6-1: Map of the Southeast Mackenzie District, Dubawnt and Athabasca Basins. BL - Beaverhill Lake, EL - Eyeberry Lake, AL - Lake Athabasca, BC - Blatchford Complex, HW - Hurwitz quartzite, SR - Slave River.

the upper unit of the Dubawnt Group. It consists mainly of sandstone (quartz arenite and orthoquartzite) and includes a basal conglomerate associated with pebbly sandstone and volcanic-rich lithic sandstone (Donaldson, 1965, 1969). A well-developed regolith is generally present at the contact between the Thelon Formation and underlying Aphebian-Archean basement (Table 6-1). Small outliers of Thelon Formation are common near the margin of the Thelon Basin and an inlier of white quartzite that has tentatively been correlated with the Aphebian (Lower Proterozoic) Hurwitz Group (Table 6-1) forms a prominent ridge northeast of Eyeberry Lake, (HW in Fig. 6-1).

The Thelon Formation is similar to, and possibly correlative with, the Athabasca Formation to the south in northern Saskatchewan. The Athabasca Basin has been the focus of intensive uranium exploration for several years, and numerous uranium deposits and showings have been found (Dahlkamp, 1979).

The basement rocks are intrusive granites and granodiorites separated by belts of metasedimentary and metavolcanic gneisses of Lower Proterozoic age (1.6 to 1.8 b.y. BP.). The latter are considered favourable targets for unconformity-related uranium deposits of the Key Lake-Rabbit Lake type (Dahlkamp, 1978).

TABLE 6-1: FORMATIONS - WESTERN THELON PLAIN.

Helikian	Diabase and related dike rocks
	DUBAWNT GROUP: dolostone; silicious dolostone; basalt
	Thelon Formation: sandstone; pebbly sandstone, conglomerate; minor siltstone; mudstone
	~~unconformity (regolith)~~~
Aphebian	HURWITZ GROUP: quartzite; minor siltstone
	Aphebian Basement: ultramafics; mafic, intermediate and felsic gneiss; pelitic and calcareous gneiss; intrusive rocks (granite, granodiorite, undifferentiated granitoid gneiss and Muskeg Lake Granite)
Archean	Archean Basement: gabbro, diorite, quartz diorite, granodiorite, granite

In 1982 and 1983, mineral exploration was considerably less than the 1980-1981 period, when up to eight companies had field crews in the Thelon Basin area, whereas only two companies were active in 1982-83. This decrease, which can be related to the decrease in energy prices brought on by the onset of the 1982 economic recession and a world-wide surplus of uranium, is reflected in the decrease in the number of prospecting permits taken out in the Thelon Basin. Sixteen permits were taken out in 1980 and six in 1981, but none in 1982 and 1983. An appreciation for the suddenness and magnitude of this decrease can be obtained by comparing the area of claims and prospecting permits in good standing and actively explored in 1982 or 1983 (Fig. 6-2) with 1981 mineral holdings (Fig. 6-3).

DUBAWNT BASIN PROJECT

Urangesellschaft Canada Ltd.	Uranium
#3100, 2 Bloor St. E.	65 L,M; 75 I,P
Toronto, Ont., M4W 1A8	62°00'-63°30'N
	102°30'-105°30'W

REFERENCES

Curtis and Miller (1980); Donaldson (1965, 1969); Gibbins (1983a,b, 1984); Laporte (1974, 1979, 1981); Padgham and others (1978); Wright (1967).

PROPERTY

Numerous claim groups. See Fig. 6-2 and succeeding sections.

LOCATION

The claims lie south of the Thelon Game Sanctuary in the upper Thelon River-Beaverhill Lake-Mosquito Lake area, 560 km east of Yellowknife. Most of the claims cover the Thelon Formation-basement contact (Fig. 6-2).

HISTORY

Several permits were acquired and explored in the Thelon area during the uranium boom of 1968-1969, however, no significant uranium concentrations were detected (Laporte, 1974a and Padgham and others, 1978). Urangesellschaft Canada Ltd. did reconnaissance geological surveys in 1975 and acquired 10 prospecting permits in 1976, 5 in 1977, 6 in 1978 and 8 in 1979. Results of reconnaissance geological, geochemical and radiometric surveys on the permits (Laporte, 1979, 1981 and Gibbins, 1983a) prompted the staking of the JOE, AL, LYNN, ROB, WAWA, GERY, BART, DEAN, DENIS, MARY, MIKE, MILT and TOM

claim groups. Permits 458 to 461 lapsed at the end of 1979, but parts of Permits 459, 460 and 461 were retained as the ART, CHARLY and PET claims. When Permits 492-497 lapsed at the end of 1980, parts of Permits 494-496 were retained as the HANK claims, 492 as the EVA claims and 493 as the CHUCK claims. Permits 632, 636-637 and 640 were relinquished at the beginning of 1981 and the remainder at the beginning of 1982.

Summaries of work done on the Dubawnt Basin Project in 1979-81 are given in Gibbins (1983b, 1984).

After the 1981 field season, Urangesellschaft Canada Ltd.'s Dubawnt project incorporated the Boomerang Lake Project of Hudson Bay Oil and Gas Ltd. in a joint venture project that also involved Alberta Energy Co. Ltd. The 1982-83 work was basically confined to the western margin of the Thelon Basin, where it intersects the Elk River Gneiss Belt (Fig. 6-1). The area corresponds to the Boomerang Grid (LEM claims of Hudson Bay Oil and Gas Ltd., Fig. 6-4) and the adjoining Elk River Grid (ART claims of Urangesellschaft Canada Ltd.).

The NIT 1-6 (75 I/10) and ARF 1-2 claims (75 I/11) (Fig. 6-2) were staked in 1982. The NIT claims cover the northwest corner of Prospecting Permit 725, held by Hudson Bay Oil and Gas from 1980 to 1983.

DESCRIPTION

The Dubawnt project lies within the Churchill Structural Province and is underlain primarily by an Archean basement complex consisting mainly of steeply dipping gneisses and impure granitic rocks (Wright, 1967).

Several quartz diorite, diorite and gabbro bodies intrude the gneiss. The relatively unaltered mineral assemblage of these intrusions suggests that they are probably Aphebian or younger in age. Their mineralogical composition and metamorphic assemblage are lower grade than most of the other basement gneiss. An orthoquartzite ridge surrounded by Thelon Formation east of Eyeberry Lake has been tentatively identified as Aphebian Hurwitz quartzite.

The Paleohelikian Dubawnt Group lies unconformably on the igneous, metamorphic and deformed sedimentary rocks described above. The Dubawnt Group consists of flat-lying unmetamorphosed Thelon sandstone and conglomerate. Dubawnt volcanics (Pitz Fm.) have also been observed in the southern section of the project area. They consist mostly of trachytes with minor lamprophyre, dacite and andesite dykes and frost-heaved boulders.

Diabase dykes present in several locales are believed to be the youngest rocks in the project area.

A mantle of loose blocks and boulders covers much of the area. Deposits of till and outwash sand and gravel are widespread. Glacial landforms such as eskers and drumlins are common, and together with striated and grooved bedrock provide a clear indication of the southwesterly direction of ice movement. Eskers and outwash are characterized by active sand dunes. Abandoned Pleistocene beaches flank many of the hills several tens of feet above the present water level.

The 'western claims' are those that either cover the western margin of the Thelon Basin or lie further to the west (Fig. 6-2). These claims are mainly underlain by Archean-Aphebian paragneiss containing narrow zones of cataclasite and mylonite. Mafic to felsic metavolcanics are interbedded with garnet-biotite gneiss near southeastern Cruikshank Lake in NTS area 75 P/11. A 1978 airborne VLF-EM survey on Permits 494 to 497 outlined four conductors corresponding to cataclastic zones that appear to be related to the northeast extension of the McDonald Fault Zone. One uranium showing, the Hanbury showing, is in a cataclastic zone near the boundary of the Thelon Game Sanctuary, about 8 km west of the Archean-Helikian unconformity and 8 km east of Cruikshank Lake. The showing consists of several frost-heaved boulders of highly hematized and brecciated basement rock. Chlorite, carbonate and minor pyrite are present in these boulders. One sample assayed 5.27% U_3O_8 and 0.011% ThO_2.

CURRENT WORK AND RESULTS

The 1982 work was confined to the 'western claims' and consisted mainly of fill-in geophysics (input, magnetic and Track Etch surveys) and geochemistry (polonium in soil samples). The 1983 work was mainly drilling. About 25 holes (2600 m) were drilled on the Elk River and Boomerang grids. Several holes intersected uranium associated with graphitic basement rock.

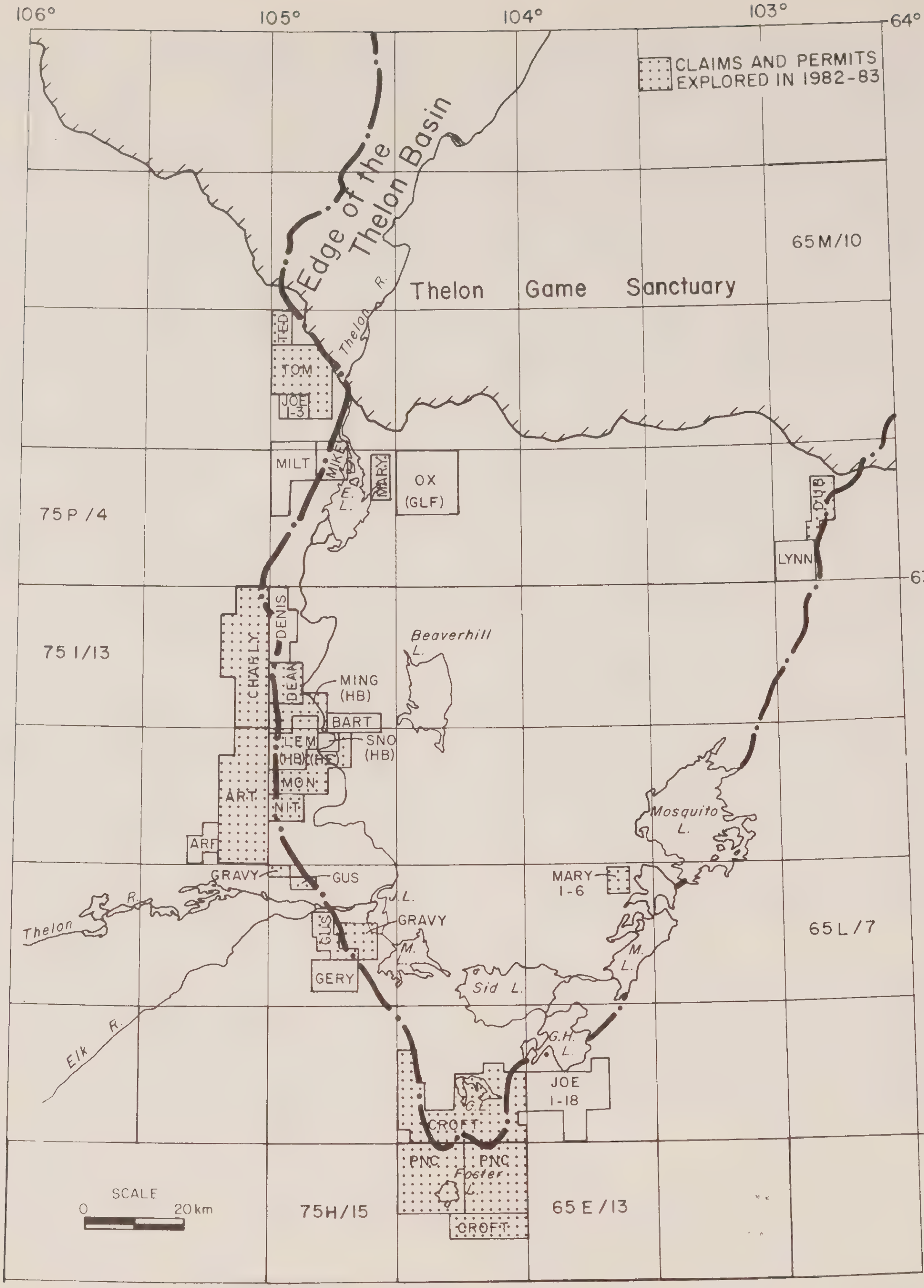


FIGURE 6-2: 1982-83 Claims and permits - Western Thelon Plain. JL -Jim Lake, GHL - Gravel Hill Lake, UG - Urangsellschaft Canada Ltd., HB - Hudson Bay Oil and Gas Ltd., GLF - Gulf, P.N.C. - PNC Exploration (Canada) Ltd.

Urangesellschaft Canada Ltd. claims:

ARF	1-2	75I/10,15	JOE	1-3	75P/7	MILT	1-10	75P/2
BART	1-8	75I/15	LYNN	2-6	65M/2	GUS	1-10	75I/7
DEAN	1-6	75I/15	TOM	1-14	75P/7	JOE	1-18	75I/10
DENIS	1-7	75I/15	MARY	1-4	75P/2	ART	1-25	75I/11
GERY	1-12	75I/7	MIKE	1-5	75P/2	CHARLY	1-20	75I/14

PNC Exploration (Canada) Ltd. claims

CROFT	1-29	75I/1
CROFT	30-35	75H/16
MARY	1-6	65L/5
DUB	1-6	65M/2

Hudson Bay Oil and Gas Ltd. claims:

LEM	1-13	75I/10	MING	1-11	75I/15	MON	1-11	75I/10
SNO	1-5	75I/10	AN	1-3	75I/15	NIT	1-5	75I/10

Gulf Minerals Canada Ltd. claims:

OX	1-20	75P/1

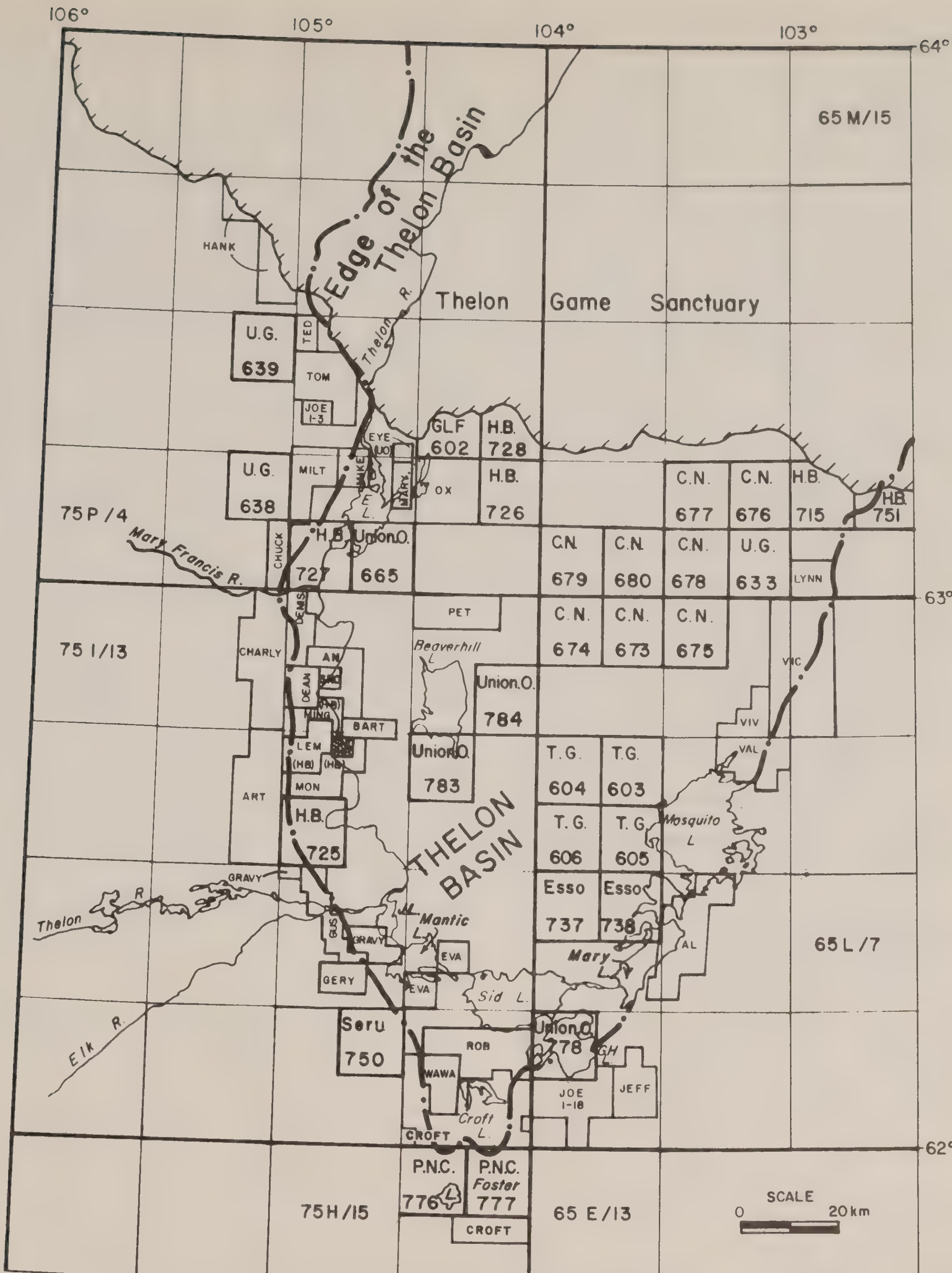


FIGURE 6-3: 1981 Claims and permits - Western Thelon Plain. JL - Jim Lake, GHL - Gravel Hill Lake, UG - Urangesellschaft Canada Ltd., HB - Hudson Bay Oil and Gas Ltd., GLF - Gulf, TG - Texasgulf Inc., CN - Canadian Nickel Co. Ltd., SO - Esso Resources Canada Ltd., Union O - Union Oil Co. Ltd.

Urangesellschaft Canada Ltd. claims:

WAWA 1-12	75I/1	JOE 1-3	75P/7	MILT 1-10	75P/2	ART 1-25	75I/11
BART 1-8	75I/10,15	LYNN 2-6	65M/2	ROB 1-23	75I/1	CHARLY 1-20	75I/14
DEAN 1-6	75I/15	TOM 1-14	75P/7	GUS 1-10	75I/7	PET 1-12	75I/16
DENIS 1-7	75I/15	MARY 1-4	75P/2	AL 1-22	65L/6	EVA 10-17	75I/8
GERY 1-12	75I/7	MIKE 1-5	75P/2	JOE 1-18	75I/10	CHUCK 1-6	75P/3
HANK 1-14	75P/11	VIC	65L/15	VIV	65L/14	VAL	65L/11

Hudson Bay Oil and Gas Ltd. claims:

LEM 1-13	75I/10	MING 1-11	75I/15	MON 1-11	75I/10	AN 1-3	75I/15	SNO 1-5	75I/15

Gulf Minerals Canada Ltd. claims:
OX 1-20 75P/1

Union Oil Co. Ltd. claims:
EYE 1-14 75P/7

PNC Exploration (Canada) Ltd. claims:
CROFT 1-36 75 H/15, I/1

DUBAWNT BASIN PROJECT

GRAVY 7, GUS 2-8 — Uranium

Urangesellschaft Canada Ltd. — 75 I/7

#3100, 2 Bloor St. E. — 62°25'N,104°50'W

Toronto, Ont., M4W 1A8

REFERENCES

Gibbins (1984); Miller (1983).

DIAND assessment report 081593.

PROPERTY

GRAVY 7, GUS 2-8

LOCATION

The claims follow the southwestern boundary of the Thelon Basin, centred on the junction of the Thelon and Elk Rivers about 20 km west-northwest of Mantic Lake (Fig. 6-2). The adjoining GERY claims lie south of the GUS claims and west of Mantic Lake.

HISTORY

The GUS claims were staked in 1979 to cover the Thelon Formation-basement unconformity in an area where a 1978 airborne VLF-magnetic survey indicated conductors and possible metasedimentary basement rock. The adjoining GRAVY claims were staked in 1980. NTS area 75 I/7 had previously been held by Urangesellschaft Canada Ltd. as Prospecting Permit 380 (1976 to 1978) and by Houston Oils Ltd. and Trudel Minerals Ltd. as Prospecting Permit 115 (1969 to 1971).

In June,1981 Questor Surveys Ltd. was contracted to fly some 244 line-km of Input EM and magnetometer surveys over the GUS claims. Only a few weak Input anomalies were found and these were attributed to conductive overburden. Also in 1981, the Gusto grid (41 km of line) was established at the junction of a VLF anomaly and the sub-Thelon Formation unconformity (GUS 6 and 7). VLF-EM 16, magnetic and soil surveys were done in the grid area. A moderately strong VLF anomaly, corresponding to the airborne-detected anomaly, follows a pronounced magnetic low within an area of strong magnetic relief. Most of the 448 soil samples contain less than 0.2 ppm uranium and do not reveal any anomalous trends or clusters (Gibbins, 1984).

DESCRIPTION

The claims cover the Thelon Formation-basement unconformity where the 1978 airborne geophysical surveys show a prominent northeast-trending magnetic high, possibly a strongly magnetic mafic gneiss, and several moderately strong VLF conductors. Basement gneisses and, less commonly, massive granites were mapped. The only Thelon sandstone encountered were a few frost-heaved boulders on GUS 6.

The Lone Tree grid area (GUS 8, 62°20'N, 104°45'W) covers the contact between gneisses and dioritic instrusives. The spatial relationship of the two rock types in outcrop indicates a gradational boundary between the gneisses and dioritic intrusions. The Junction Lake grid (62°28'N, 104°48'W) covers parts of GRAVY 7 and GUS 2, 4-6 claims.

CURRENT WORK AND RESULTS

1982

Two separate projects were undertaken on the GUS and GRAVY claims in 1982. Semi-reconnaissance soil sampling, mapping and scintillometer surveying (prospecting) were completed in the 'Junction Lake' area, while detailed mapping, soil sampling, ground VLF, magnetometer and Max-Min surveys tested the Lone Tree grid on GUS 8.

A single highly radioactive boulder was found in the northeast corner of the 'Junction Lake' subarea. It consisted of hematized sandstones, containing 700 ppm uranium, 20.8 % CaO and 14.2% P_2O_5, characteristic of uranium-rich apatite from other areas of the Thelon Basin (Miller, 1983). The analytical results of 323 soil samples demonstrated a very low uranium background in the Junction Lake area. The average was 1.2 ppm U_3O_8, with a range of 0.1 to 19.1 ppm. A weak northeasterly trend of higher results seems to be related to a similar trend in underlying gneisses.

A total of 36.9 line km of grid was established on the Lone Tree grid. Approximately 99% of the area is overlain by muskeg, glaciofluvial and glaciolacustrine overburden. Limited outcroppings and statistical analysis of boulders indicate the presence of Thelon sandstone on the northeast end of the grid.

A total of 720 soil samples show a very low uranium background (average 1.2 ppm U_3O_8, range of 0.1 to 15.3 ppm and threshold of 4.0 ppm). Approximately 90 percent of the soil samples with uranium assays greater than threshold are in the northeast part of the grid, adjacent to the Aphebian-Archean/Helikian unconformity as indicated by VLF and boulder data.

Ground geophysical follow-up over a major airborne VLF conductor suggests its source is a near-surface fault with little or no graphite, approximately at the sub-Thelon Formation unconformity.

THELON WEST PROJECT
LEM, MON, MING, AN,
SNO AND NIT CLAIMS — Uranium

Urangesellschaft Canada Ltd. — 75 I/10,15
Hudson's Bay Oil and Gas Co. Ltd. — 62°40'N,104°8'W
(now Dome Petroleum Ltd.)
Alberta Energy Co. Ltd.

REFERENCES

Gibbins (1983b, 1984); Laporte (1979); Padgham and others (1978); Wright (1967).

DIAND assessment reports: 081615 (Boomerang grid - 1982); 081568 (Disco Grid - 1982); 081736 (Boomerang and Disco grids - 1983).

PROPERTY

LEM 1-13, MING 1-11, MON 1-11, AN 1-7, SNO 1-5 and NIT 1-6.

LOCATION

The claims are near the western margin of the Thelon Basin, about 20 km west of the southwest corner of Beaverhill Lake (Figs. 6-2, 6-4). Yellowknife lies 500 km to the west of the claims.

The Disco grid is in the MING 4,5,8-9 claim area (62°46'N, 104°55'N - 75 I/15) and extends northward into the adjacent DEAN claims. The Boomerang grid (62°41'N, 104°2'W - 75 I/10) was extended in 1982 southwestward to include parts of the LEM 1-3, 5 and 11 and MON 1 and 2 claims (Fig. 6-4) and reach the northeast boundary of the Elk River grid on the ART claims (75 I/11).

HISTORY

In 1969 United Bata Resources Ltd. held mineral rights in the area as Prospecting Permit 174 and conducted airborne radiometric and photogeological surveys as well as ground checks of airborne anomalies (Padgham and others, 1978).

In 1976 Urangesellschaft Canada Ltd. acquired 10 permits, including Prospecting Permits 381 (75 I/10) and 382 (75 I/15). They did radiometric and lake-sediment surveys of this and adjacent permit areas from 1976 to 1978 (Laporte, 1979, p. 44). Prospecting Permits 381 and 382 expired in March,1979. In June 1979, Hudson Bay Oil and Gas Co. Ltd. staked the LEM claims. The adjacent MING and MON claims were added in December, 1979, the AN claims in June,1980 and the SNO claims in July,1981. The NIT claims were recorded in October,1982 by Urangesellschaft Canada Ltd. They cover the northwest corner of what was Prospecting Permit 725 (see Gibbins,1984, p. 122).

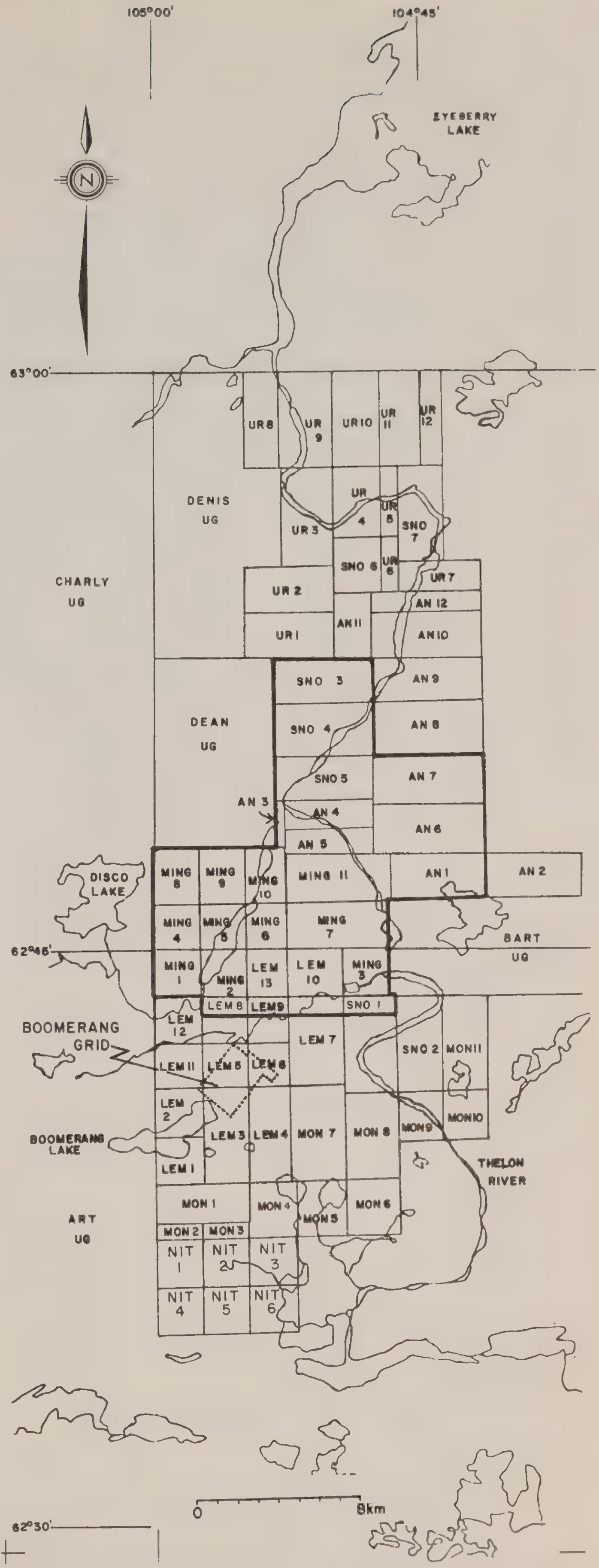


FIGURE 6-4: Boomerang Lake claims of the Thelon West project.

In June of 1979, Hudson's Bay Oil and Gas contracted Questor Surveys Ltd. of Mississauga, Ontario to fly approximately 2600 line-km of electromagnetics and magnetics using their INPUT system. One conductive zone, referred to as Zone 7A, was identified as being due to a bedrock source and the LEM 1-13 claims were staked to cover this zone and its possible extensions. This zone trends northeast, and lies northeast of Boomerang Lake (Fig. 6-5).

A limited ground geophysical program was undertaken in July, 1979 to verify and accurately locate the INPUT-EM conductors (Gibbins, 1983b).

In 1980-81, the Hudson's Bay Oil and Gas Ltd. in house data-acquisition system (radiometrics and VLF-EM) was flown over 400 line-km of the claims. This work did not detect significant radioactivity, however, numerous VLF conductors were recorded.

Elfast Turam EM work in the spring of 1980 confirmed two parallel conductive zones northeast of Boomerang Lake (Fig. 6-5). They are at least 6 km long and at a depth of about 100 m. A concurrent gravity survey (1076 stations) showed a possible step fault in the conductive zone. Additional Turam work in 1981 failed to indicate any significant bedrock conductors in the MON claims, but did succeed in outlining a previously undiscovered conductive zone on MING 9 and further extended and delineated a major conductive zone cross-cutting the LEM claim area (Gibbins, 1984).

In April-May, 1980, five percussion holes (663 m) were completed along the conductive zone. Three of these holes reached graphitic basement.

Some 300 frost-boil samples were collected from permits and claims, but no significant results were obtained.

Questor Surveys Ltd. was contracted to fly 615 line-km of INPUT survey over the parts of the claim and permit areas not flown in 1979. This survey outlined numerous isolated conductors that are interpreted to be of surficial origin and defined a westerly trending strike extension of the bedrock conductor on the LEM claims and also confirmed the presence of a small bedrock conductor on MING 9.

DESCRIPTION

The LEM claims straddle the western margin of the Thelon Basin (Wright, 1967). This margin is defined by the sub-Dubawnt Group unconformity with flat-lying unmetamorphosed sandstones of the Thelon Formation to the east and underlying Aphebian basement to the west. The Hudsonian Orogeny has developed a generally northeasterly foliation in these basement rocks. The Aphebian basement is mainly granite and granitic gneisses with smaller areas of metapelites and gneisses. However, the LEM claims contain the northeasternmost exposure and subsurface continuation of the Elk River Gneiss Belt (Fig. 6-1), which is composed of paragneiss with numerous graphitic zones.

CURRENT WORK AND RESULTS

<u>Boomerang Grid</u>

<u>1982:</u>

A major portion of the Boomerang Lake Grid was established by Urangesellschaft staff early in the season. Lines 86W to 16W represent the new gridded area and lines 15W to 22E were re-established.

An extensive geophysical and geochemical program was completed on the Boomerang Lake Grid during the summer of 1982 in order to define drill targets for testing in 1983. Table 6-2 summarizes all the surveys completed.

The systematic sampling of A_0 organic material delineated several sample clusters anomalous in U_3O_8, including a broad anomalous zone which parallels the 12+00S baseline between 66W and 80W and is closely associated with a major EM conductor. The B_1 soil samples analysed for Polonium 210 revealed a large anomalous cluster in the area of 14+00S and

TABLE 6-2: GEOPHYSICAL AND GEOCHEMICAL WORK COMPLETED ON THE BOOMERANG GRID - 1982

Gridding Boomerang Lake Grid	147.1	line km
Re-Gridding Boomerang Lake Grid	59.3	line km
A_0 Soil Sampling	693	samples
B_1 Soil Sampling	568	samples
Polonium-210	568	samples
Track Etch	1095	cups
Scintillometer Survey	93.1	line km
Max-Min II - 150 m coil separation*	74.3	line km
Max-Min II - 250 m coil separation*	56.8	line km
VLF (Geonics), Seattle, Washington	197.4	line km
VLF (Geonics), Annapolis, Maryland	21.7	line km
Turam (ELFAST) - 50 m coil separation (25, 75, 225, 675 and 2025 Hz)	2.0	line km
Magnetics (EDA Omnimag System)	206.4	line km
Gravity (LaCoste and Romberg)	133.2	line km
Resistivity (Geonics EM-16R)	1.1	line km

* (3555 and 888 Hz)

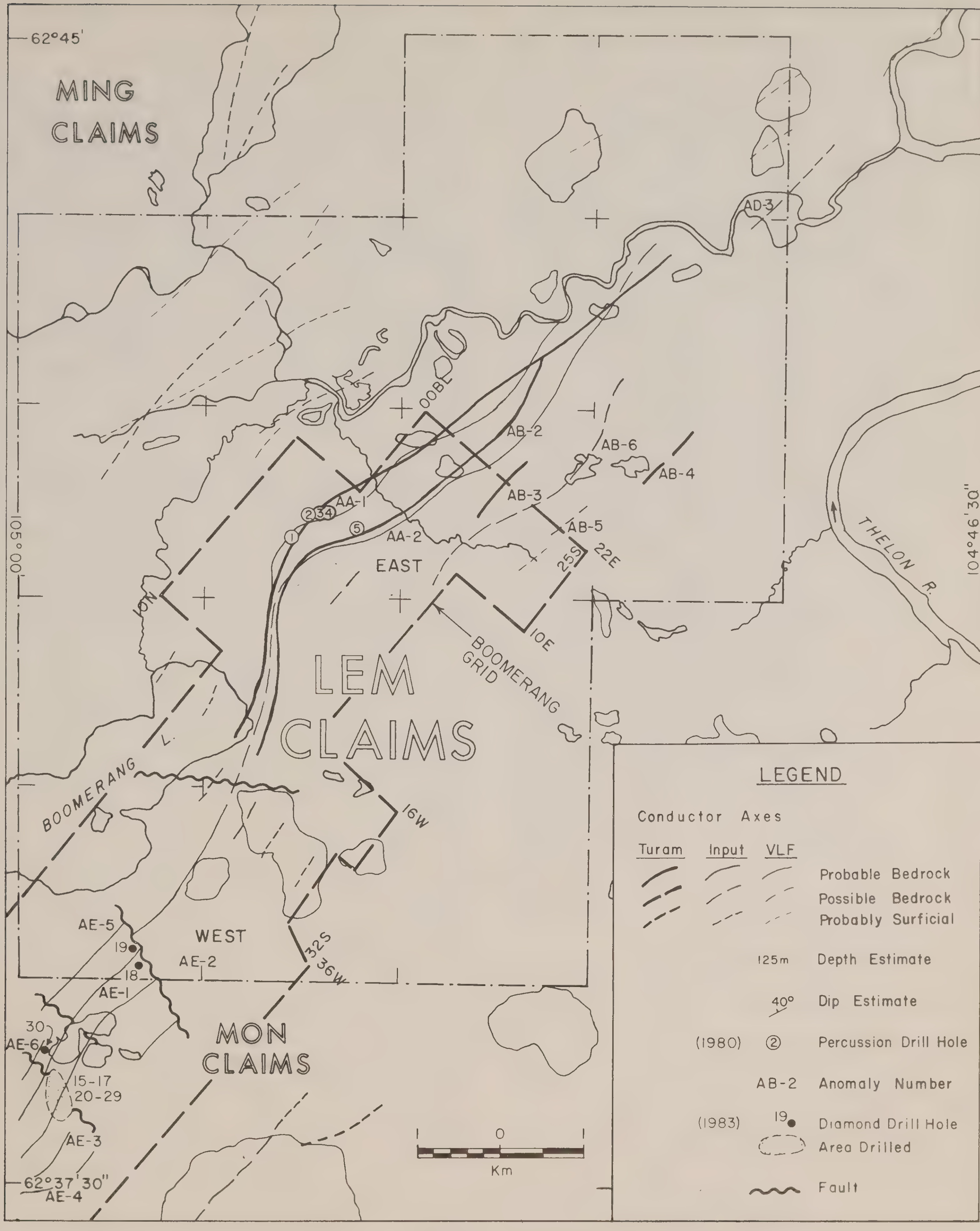


FIGURE 6-5: EM conductors and drill holes, LEM and MON claims, Boomerang Grid

56+00W that is relatively close to a weakly anomalous zone of radioactivity. The Track Etch survey did not delineate any outstanding anomalous zones, but indicated that there is a relatively high radon background present at the Boomerang Lake grid.

The electromagnetic surveys completed on the Boomerang Lake grid outlined several good conductors. Their number diminishes from 5 in the southwest portion of the grid to 2 in the northeast. Depth calculations estimated from the HLEM and magnetic data suggest that these conductors vary in depth from 60 to 90 m from west to east respectively. The conductors are very well defined in the western half of the grid, but to the east of 32+00W their presence has not been defined.

The magnetic survey outlined several anomalies oriented both parallel and orthogonal to the strike of the conductors in the area. Depth-to-basement calculations indicate that a cover of 100 to 125 m is fairly uniform across the grid. Three subtle gravity lows were detected on the west half of the grid. The lows could be caused by changes in bedrock lithology, changes in Thelon Formation sandstone or overburden thickness or possibly by alteration. The lows occur on conductors and/or at the intersections of faults.

1983: (from DIAND assessment report 081736.)

Twenty-two holes totalling 2084 m were drilled on the Boomerang Lake grid in 1983 (Fig. 6-5). Steeply dipping semi-pelitic metasediments and intercalated graphitic gneisses unconformably overlain by up to 45 m of flat-lying Thelon sandstone were intersected. This drill program was successful in delineating strongly altered sandstone overlying minor uranium concentrations in association with significant precious metal concentrations near the unconformity in holes BL-83-17 and 21.

Close association of uranium with the unconformity and with strongly altered sandstone indicates that processes, such as those that created the large high-grade deposits in Saskatchewan and Australia, have been active in the Thelon West joint venture area. This is important because it represents the first documentation of unconformity-type uranium concentrations in the upper Thelon basin area. The best intersections in holes 17 and 21 are given below:

BL-83-17 103.8 - 106.3 m (2.5 m) 2.89 oz/ton Ag and 0.026% U_3O_8.

BL-83-21 98.7 - 100.7 m (2.0 m) 0.265 oz/ton Au and 0.136% U_3O_8, of which 0.5 m yielded 0.66 oz/ton Au and 0.500% U_3O_8.

The results from the Track Etch cups that were retrieved during the 1983 field season indicate the presence of four moderately anomalous zones. One of these zones appears to be closely related to the zone intersected in hole BL-83-21.

The Turam survey indicated that the conductors are continuous in the central portion of the Boomerang Lake grid. No further information was gained by the brief resistivity survey.

A careful review of data available has been recommended so that criteria for the identification of good drill targets can be established and applied.

Disco Grid (MING 4, 5, 8-10)

1982:

The Disco Lake grid, consisting of 57.4 km of line with 200 m spacing, was established with a base line trending Az 40° parallel to Input EM anomalies found in 1979.

Analyses of several hundred soil samples from the A_0 horizon delineated a few clusters of anomalous uranium concentrations, (i.e., 4 to 11 ppm U_3O_8). A scintillometer survey done at the same time resulted in average readings of 45 cps, with a few readings up to 80 cps (Urtec UG-135 spectrometers).

The magnetic survey revealed a relatively homogenous regional pattern. A highly magnetic anomaly on the northern boundary of the grid is believed to be related to ultramafic rocks. A weak but distinct magnetic low in the eastern portion of the grid may be related to Thelon sandstone and corresponds to a gravity high, an EM conductor and anomalous A_0 soil samples. Another subtle gravity anomaly exists on the east side of the strongest EM anomaly.

A detailed Max-Min (HLEM) survey delineated two subtle northeast-trending electromagnetic conductors. Both anomalies have very little out-of-phase response and are believed to be non-graphitic; probably due to wet clay in fault zones. The conductors were also outlined by a turam survey; and VLF lines failed to identify conductors perpendicular to the northeast trend.

1983:

No work was done on the Disco Grid in 1983.

DUBAWNT BASIN PROJECT

ART 1-25: ELK RIVER & SAHARA GRID — Uranium

Urangesellschaft Canada Ltd. — 75 I/11

$62^{o}38'N, 105^{o}06'W$

REFERENCES

Gibbins (1984).

DIAND assessment reports: 081614 (1982) and 081714 (1983).

PROPERTY

ART 6-9, 18-19	Elk River Grid	$62^{o}36'N, 105^{o}04'W$
ART 20-22	Sahara Grid	$62^{o}33'N, 105^{o}08'W$

LOCATION

The ART claims are directly west of the western trace of the Thelon Formation-basement unconformity, which approximates $105^{o}W$ longitude, and 10 to 20 km east of Breithaupt Lake. This area is about 5 to 30 km north of the Thelon River (Fig. 6-2).

HISTORY

Prospecting Permit 459 was granted to Urangesellschaft Canada Ltd. in 1977.

In 1977 lake-water and lake-sediment geochemical surveys were done, but no significant uranium or radon concentrations were recorded. However, detailed mapping and petrographic studies in the eastern half of the permit area delineated a northeasterly trending metasedimentary-metavolcanic belt.

In 1978 airborne geophysical surveys indicated very strong, northeast-trending VLF conductors in the metasedimentary belt and prompted the staking of the ART claims in 1979 before the permit lapsed.

Early in 1980 the Elk River grid was established on the ART 6-9, 18 and 19 claims in the center of the claim group between latitudes $62^{o}35'$ and $62^{o}39'N$. Most of the subsequent work has been done on this grid as it contains the favourable belt of meta-volcanic-metasedimentary rocks and the VLF conductors. The eastern boundary of the grid adjoins the LEM and MON claims (Figs. 6-2, 6-6). The Elk River grid was the focus for a variety of geochemical

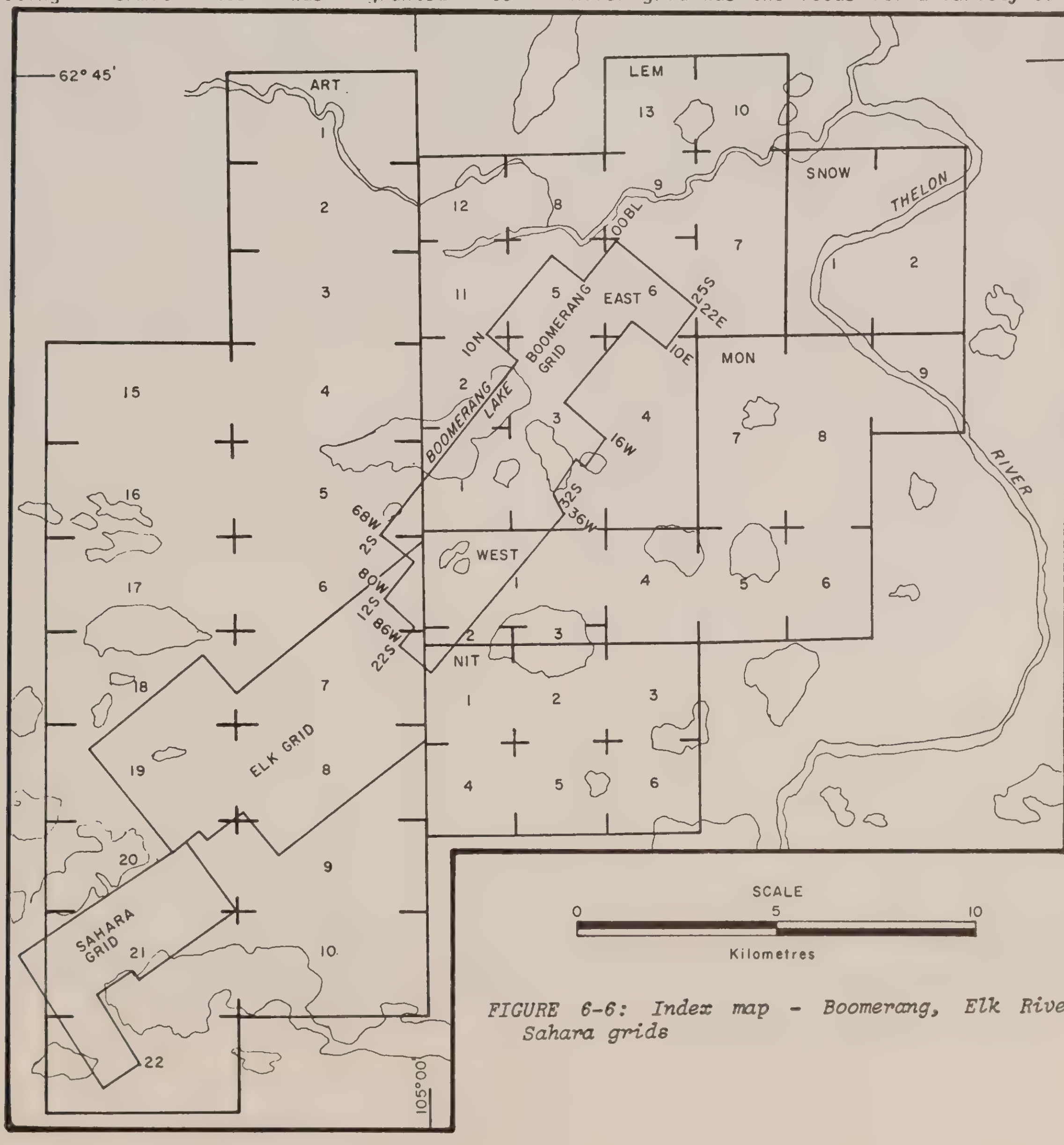


FIGURE 6-6: Index map - Boomerang, Elk River and Sahara grids

and geophysical surveys completed during the 1980 and 1981 field seasons (Gibbins, 1984, p. 214). An airborne Input survey was flown over the entire area in 1981.

DESCRIPTION

The ART claims are underlain by a northeasterly trending belt of metavolcanics, metasedimentary and granitic gneisses of Aphebian to Archean age: the Elk River Gneiss Belt (Fig. 6-1). These gneisses are generally steeply dipping with stringers and lenses of granitic intrusive or migmatitic material. To the east, unconformably overlying the gneissic basement sequence, is the flat-lying, Paleohelikian, Thelon Formation sandstone of the Dubawnt group.

Glacially-derived overburden covers more than 90% of the claim area, with muskeg drumlins, eskers, and beach ridges forming topographic highs.

CURRENT WORK AND RESULTS

Elk River Grid

1982:

Prospecting teams explored the area underlain by northeast-trending HEM conductors, but failed to find outcrop or boulders of graphitic schists or gneiss. The large number of sandstone boulders found in the area supports the idea of a southwestward extension of the Thelon sandstone along the major HEM conductors.

A Track Etch survey (450 cups at 50 m intervals along lines spaced 100 m apart) showed good clustering of anomalous radon samples closely associated with a broad gravity low and two strong HEM conductors. A good correlation exists between the Track Etch radon anomalies, and helium and uranium in soil anomalies in the target area.

Pulps from 312 B horizon soil samples collected in 1981 were analysed for Polonium 210 and loss-on-ignition by Monenco Analytical Laboratories. Polonium-uranium activity ratios (Po:0.33U) were calculated and contoured.

Geophysical work in 1982 included 45 km of VLF-EM, 25.7 km of gravity and 66 km of magnetic surveys. Results from the VLF survey indicate poorly conductive, structural features suggestive of faulting.

The ground magnetometer survey in the western portion of the grid demonstrates magnetic banding similar to that found on the eastern portion in 1981. The banding is caused by the high magnetic susceptibility of some of the metasedimentary felsic gneisses as compared with the relatively low susceptibility of graphitic schists.

The contoured Bouger gravity data indicates two gravity lows. They may represent alteration zones.

1983:

Fourteen holes totalling 1345 m were drilled on the Elk River grid (ART 6 and 7) during 1983. Moderately to strongly chloritized altered zones related to shearing and brecciation were delineated in a series of steeply dipping, semi-pelitic metasediments, but no significant uranium concentrations were defined. Several holes intersected graphitic gneisses, which appear to be the cause of the conductors.

The 1983 gravity and the Track Etch surveys did not yield any significant anomalies worthy of immediate follow-up.

The tremendous overburden thicknesses encountered in the 1983 drilling downgrade the importance of many of the anomalies previously thought to be important. Most of the gravity lows appear to be caused by increased overburden depths, and the presence of at least 35 m of frozen sand deposited by post-glacial lacustrine and fluvial processes would strongly suppress any geochemical anomalies.

One of the more significant results of the 1983 drill program was the fact that no substantial thicknesses of sandstone were intersected. However, it is felt that the overburden-basement interface is very close to the unconformity for the following reasons:

i. Sandstone that is thought to represent bedrock was intersected over widths of up to one metre in holes ER-83-1 and 5.

ii. A 60 cm dyke containing sandstone that was intersected in hole ER-83-1 probably represents a sandstone-filled fracture close to the unconformity.

iii. Strong paleo-weathering as expressed by textural and mineral destruction of lithologies at the top of the basement followed by a decreasing degree of hematization downhole is present in most of the drill holes.

A major shear zone within a 9-m-thick section of strongly altered biotite gneiss with associated anomalous boron concentrations was noted in hole ER-83-3. In addition, several narrower brecciated and

sheared zones with accompanying weak to moderate alteration are present in several other drill holes. However, none of these zones contain significant uranium concentrations.

Only a small portion of the conductors on the Elk River grid have been tested, but future drill target delineation will be difficult because of the heavy overburden cover.

Sahara Grid

1982:

The Sahara grid consists of some 95 km of grid established southwest of the Elk River grid in 1982 to follow up conductors identified from airborne geophysics and to trace the extension of the Elk River grid conductor system. Geochemical, magnetometer, VLF and HLEM (Apex Max-Min) surveys were done.

A total of 643 soil samples were taken from the organic A_0 layer in the southwestern portion of the grid where significant soil has developed. Results indicate a low uranium background (maximum 7.4 ppm U_3O_8). No significant clustering of anomalous samples is evident, but several spot anomalies show a linear trend. The northern portion of the grid is covered with sand of a reworked esker-beach complex and little or no soil development.

The airborne-detected EM conductors in the southwestern portion of the Sahara grid were confirmed by ground geophysical surveys. These conductors appear to be a laterally displaced extension of the Elk River conductors. Max-Min surveys, using various cable lengths, indicate that the conductors end abruptly rather than becoming deeper. A north-trending regional magnetic low is believed to represent a fault that displaced the strong EM conductors north of the Sahara grid.

DUBAWNT BASIN PROJECT

CHARLY 6-8 — Uranium
Urangesellschaft Canada Ltd. — 75 I/14
$62^{O}50'N,105^{O}W$

REFERENCES

Gibbins (1984); Wright (1967).

DIAND assessment report 081572.

PROPERTY

CHARLY 6-8.

LOCATION

The CHARLY claims are near the western boundary of the Thelon Basin, some 25 km west of Beaverhill Lake and 540 km east of Yellowknife (Fig. 6-2).

HISTORY

The claims are in NTS area 75 I/14, formerly permitted to Urangesellschaft as permit 460 from 1977-1979. The claims were staked in 1979. Geological mapping in 1978 outlined a small belt of pelitic metasediments. Considerable geophysical and geochemical work was done on the CHARLY claims in 1980 and 1981 (Gibbins, 1984).

DESCRIPTION

Most of CHARLY 6 and the northwest corner of CHARLY 7 (Olson Lake area) are underlain by a northeast-trending belt of feldspar-biotite-gneiss, believed to represent pelitic metasediments related to the Elk River Gneiss Belt. The belt is normally marked by a major aeromagnetic low, but the 'Olson Lake' area (CHARLY 6-8) is characterized by much higher magnetic relief.

CURRENT WORK AND RESULTS

1982:

A two-man crew did geologic mapping, soil sampling and scintillometer surveys over the Olson Lake grid (CHARLY 6). A total of 161 soil samples from the A_0 horizon were analysed for uranium by delayed neutron counting. Most of the anomalous soils can be related to nearby outcrops of slightly radioactive granites and gneisses. Small discontinuous pods of sedimentary rocks are present but most of the rocks are intrusive.

DUBAWNT BASIN PROJECT

DEAN 1-6 — Uranium
Urangesellschaft Canada Ltd. — 75 I/15
$62^{O}50'N,105^{O}W$

REFERENCES

Gibbins (1984).

DIAND assessment report: 081549.

PROPERTY

DEAN 1-6.

LOCATION

The DEAN claims are 25 km west of Beaverhill Lake, on the sandstone side of the western edge of the Thelon Basin. They are adjoined by the MING claims to the south, CHARLY claims to the west and DENIS claims to the north (Fig. 6-2).

HISTORY

The area was covered by reconnaissance lake geochemistry in 1976 and 1977 (Prospecting Permit 382). In 1978 airborne geophysics and overburden

geochemistry covered the area. The claims were staked in the autumn of 1978 to cover six first-order anomalies.

In 1979, a grid was established and used as a base for magnetometer, radiometric, VLF-EM, Max-Min II, gravity, resistivity, overburden drilling and prospecting surveys. Up to 400 m of sandstone masked much of the magnetic and some of the VLF-EM responses. Airborne surveys were similarly affected, nevertheless, several conductors of possible bedrock origin and two second-order radiometric anomalies were identified.

The 1981 field program consisted of 20 line-km of Turam EM on the northeastern end of the Disco grid (DEAN 5 and 6), geological reconnaissance, an 80-site soil geochemistry survey on DEAN 3 and 4, and a Questor Survey Ltd. Mark IV Input and magnetometer survey (Gibbins, 1984).

DESCRIPTION

Due to a paucity of outcrops, the Helikian-Archean unconformity has not been accurately delineated, but is believed to follow approximately the western margin of the DEAN claim block. Overburden is thick, particularly in the southern part of the DEAN group where no outcrops were found. In the northern part of the DEAN group, one outcrop of coarse-grained, buff to white, horizontally bedded sandstone was found. The overburden may be thinner on the DENNIS group to the north, where several sandstone outcrops and areas of frost-heaved boulders were identified.

CURRENT WORK AND RESULTS

1982:

Detailed ground geophysical surveys completed on the southeast portion of the DEAN claims delineated a body of very high magnetic susceptibility. It probably represents a small ultramafic intrusion into the Archean/Aphebian basement assemblage. As such, it is not significant insofar as uranium mineralization is concerned.

Less distinct features include a gravity low and a weak EM conductor which flank the east side of the magnetic anomaly. Although the conductor does not appear to have a graphitic source, the evidence accumulated to date indicates that there may have been substantial alteration and cross-faulting of the unconformity.

DUBAWNT BASIN PROJECT
TOM 1-8, 10-15:

BOULDER CREEK GRID	Uranium
Urangesellschaft Canada Ltd.	75 P/7
	63°25'N,104°50'W

REFERENCES

Gibbins (1983b, 1984).

DIAND assessment report 081584.

PROPERTY

TOM 1-8, 10-15

LOCATION

The TOM claims are 10 to 20 km north of Eyeberry Lake. They are bounded by the Thelon River, the Thelon Game Sanctuary and the western edge of the Thelon Basin on the northeast and JOE 1-3 claims on the southwest (Fig. 6-2). The area is 650 km east of Yellowknife.

HISTORY

Anomalous radon concentrations were detected in lake sediments on Prospecting Permit 384 in 1976 and 1977. In 1978, ground and airborne geophysics, overburden geochemistry, mapping and two short Winkie drill holes resulted in the discoveries of 'Don's Showing' (JOE 3) and 'John's Showing' (TOM 14). The TOM and JOE claims were recorded in October of 1978.

In 1979 geological mapping and prospecting led to the discovery of radioactivity on the TOM 7 claim. Three grids were established and extensive prospecting and geophysical surveys were carried out in order to evaluate airborne-detected VLF anomalies that were close to two small uranium showings consisting of narrow pitchblende veinlets. A total of 95 line-km of VLF-EM survey was completed on the Thelon grid to test an airborne-detected VLF conductor within a magnetic low (Gibbins, 1983b).

Overburden geochemical sampling and some geophysical test lines were done over the Thelon grid in 1980. In 1981 gravity and resistivity surveys were carried out on the Thelon grid as well as more overburden geochemical sampling. Prospecting in the TOM 7 and 8 claim areas uncovered some weak radioactivity in strongly altered basement rocks which are very similar in texture and appearance to a regolith (Gibbins, 1984).

DESCRIPTION

The TOM and adjacent JOE claim groups are mainly

underlain by a northward-trending sequence of metasedimentary gneisses interspersed with narrow cataclastic (mylonite) zones. The gneisses are mostly uniform, migmatized, felsic and interpreted to be metamorphosed to upper-amphibolite facies. K-feldspar and quartz are remobilized in coarse "sweats" parallelling schistosity, and porphyroblasts are common. A large body of massive, coarse-grained granodiorite lies to the west of the gneiss.

Major shears defined by linear cataclastic zones occur at several localities within the basement complex. These rocks are mylonitic, fine-grained, and strongly hematized. Uranium minerals were found along narrow fracture zones in strongly hematized gneisses at two showings (DON and JOHN showings) (Gibbins, 1984).

CURRENT WORK AND RESULTS

1982:

The Boulder Creek grid was established on the TOM 7 and 8 claims to evaluate a uranium showing in strongly altered basement material discovered during prospecting in 1981. Geological mapping, ground magnetometer, VLF, Max-Min II and soil sample surveys were carried out over the grid.

An electromagnetic anomaly of poor conductivity was delineated by both the VLF and HLEM surveys. A distinct magnetic low correlates perfectly with this weak conductor. The conductor is truncated by a distinct topographic lineament and a minor VLF conductor to the north. A large cluster of uranium-rich soil samples was also identified in this area.

DUBAWNT BASIN PROJECT

TED AND TAD CLAIMS

NIRVANA GRID	Uranium
Urangesellschaft Canada Ltd.	75 P/7
	$63^{0}10'N,104^{0}32'W$

REFERENCES

Gibbins (1984).

DIAND assessment report 081550.

PROPERTY

TED 1-4, TAD 1-7.

LOCATION

The claims are south and west of the Radford River, where it forms the southwest boundary of the Thelon Game Sanctuary. This area is 7 - 10 km southeast of Hoare Lake and about 500 km east to east-northeast of Yellowknife (Fig. 6-2).

HISTORY

The TED claims were staked in 1971 to cover favourable areas of Prospecting Permit 384 issued in 1976. The TAD claims were staked in 1981. Geological mapping was carried out in 1978 and 1980. Soil sampling in 1980 indicated several areas containing up to 9 ppm uranium.

DESCRIPTION

The TED and TAD claims are underlain by a suite of gneissic and granitic rocks that are Aphebian or older. The gneisses have a foliation trend of northeast to southwest and are steeply dipping. Massive gabbroic dykes and sills intrude these units striking in a north-south direction. Unconformably overlying this sequence is the flat-lying Paleohelikian Thelon sandstone of the Dubawnt group.

CURRENT WORK AND RESULTS

1982:

Most of the 1982 work was done on the Nirvana grid, which mainly covers the northern part of TED 2 and the central part of TED 3. Preliminary results of an airborne Input survey, flown earlier in the season, outlined several weak but persistent Input conductors. These Input conductors, along with anomalous soil samples that were taken during the 1980 Radford River reconnaissance program, sparked interest in this area.

Sparse outcroppings of a mixture of felsic to intermediate paragneisses, trending Az 35^{0}, occur in the western corner of the grid area (northwest corner relative to grid north), the northeastern half of the grid appears to be underlain by Thelon Formation. However, most of the area is covered with muskeg and overburden.

Several hundred A_0 horizon soil samples were collected and analyzed for uranium by delayed neutron counting techniques. Clusters of readings greater than 4 ppm uranium in the western part of the grid are elongated parallel to the strike of the basement rock and to a lesser degree parallel the westerly glacial direction. These clusters are associated with VLF and/or HLEM conductors. Only a few minor spot anomalies occur east of the sub-Thelon Formation unconformity. A radiometric survey of the grid revealed anomalous readings corresponding to areas of outcrop.

The uranium potential of several weak 2 channel Input anomalies on the Nirvana grid were tested by a ground VLF (Geonics EM 16) survey and several northeast-trending conductors were delineated on the western half of the grid. A horizontal loop EM (Max-min II) survey over the western portion of the grid confirmed the VLF conductive zones and suggested they are caused by shallow bedrock conductors.

A broad magnetic low corresponds closely with the assumed trace of the unconformity and may indicate a weak alteration zone.

1983:

The TAD 1-7 and TED 1 and 4 claims were allowed to lapse.

DUBAWNT BASIN PROJECT

MARY 1-4: EYEBERRY GRID	Uranium
Urangesellschaft Canada Ltd.	75 P/2
	$63^{o}10'N,104^{o}32'W$

REFERENCES

Curtis and Miller (1980); Gibbins (1983b, 1984). DIAND assessment report 081578.

PROPERTY

MARY 1-4.

LOCATION

The claim area, which includes the Eyeberry grid, is located east of Eyeberry Lake, 510 km east-northeast of Yellowknife and 425 km west-southwest of Baker Lake.

HISTORY

Reconnaissance geochemical surveys on Prospecting Permit 383 in 1976-1977 identified two first-order uranium anomalies in overburden west of a ridge of Hurwitz Group quartzite. The MARY claims were staked in 1979 to cover these anomalies.

Prospecting, mapping and soil sampling were carried out to the northeast of Eyeberry Lake in 1977 and 1978. Several soil samples anomalously enriched in uranium were collected immediately west of the quartzite ridge, but no anomalous radioactivity was detected. In 1979 airborne, radiometric, magnetic and VLF-EM surveys detected anomalies suggesting that the orthoquartzite ridge is the surface expression of a horst block. The radiometric survey did not detect anomalous radioactivity on the claim (Gibbins, 1983b).

In 1980, the Eyeberry grid was established to further investigate the airborne-detected VLF anomalies on the flanks of the quartzite ridge near the area of soil anomalies described above. VLF and Max-Min II surveys were carried out over this grid and two gravity profiles were run over the ridge. These surveys defined a 2 mgal gravity step along the profile lines coincident with the VLF anomalies. No response was detected by the Max-Min.

In 1981, geological, geochemical, airborne and ground magnetometer surveys were done. Weak to moderate Input anomalies on the west flank of the quartzite ridge have an extremely weak EM response on the ground. The ground magnetometer survey indicates the presence of a magnetic dyke-like body. A large area of anomalous uranium in the A_0 soil horizon at the western margin of the Eyeberry grid may represent downslope dispersion of uranium from a source near the Input anomalies (Gibbins, 1984).

DESCRIPTION

The only outcrop on the MARY claims is orthoquartzite, exposed as a prominent ridge northeast of Eyeberry Lake. This orthoquartzite, which has been tentatively correlated with the Aphebian Hurwitz Group (Curtis and Miller, 1980), is massive, clean, white to pinkish and weakly banded. The orthoquartzite strikes $N15^{o}E$, parallel to the trend of the ridge, and dips vertically. The ridge is thought to be the surface expression of horst faulting, and VLF-EM surveys across the ridge have detected conductors that support this contention. The rest of the MARY group is believed to be underlain by sandstone of the Helikian Thelon Formation.

CURRENT WORK AND RESULTS

A total of 36.4 line-km of HLEM (Apex Max-min using a 250 m cable separation and 3555 Hz and 888 Hz frequencies) was completed on the Eyeberry grid. This confirmed the presence of a weak airborne EM conductor, previously defined by the 1981 INPUT survey. A second INPUT conductor could not be checked as the area is under a lake.

Deep penetrating EM work is recommended as the conductors seem to be deeply buried.

MARY 1-6	
PNC Exploration (Canada) Ltd.	Uranium
Box 11571	65 L/5
3060 - 650 W. Georgia St.	$62^{o}7'N,103^{o}38'W$
Vancouver, B.C., V6B 4N8	

REFERENCES

Donaldson (1965, 1969); Gibbins (1984); Laporte (1974, 1979); Overton (1979); Wright (1967).

DIAND assessment report 081618.

PROPERTY

MARY 1-6. 65 L/5

LOCATION

The MARY claims are midway between Mosquito Lake and Sid Lake (Fig. 6-2). This area is 550 km east of Yellowknife and 530 km northeast of Fort Smith.

HISTORY

Prospecting Permit 149 (65 L/5) was held by Gage Canadian Oil and Gas Corp from 1969 to 1971. They did radiometric prospecting, geology and geochemistry in 1970, but did not detect any anomalous radioactivity (Laporte, 1974).

Prospecting Permit 371 (65 L/5) was held by Urangesellschaft Canada Ltd. from 1976 to 1978 (Laporte, 1979).

Esso Resources Canada Ltd. obtained Prospecting Permits 737 and 738 (65 L/5, N half) in 1980 and did airborne radiometric surveys and lake-water and sediment sampling (Gibbins, 1984). These permits were relinquished in 1982.

The MARY claims were recorded on September 9, 1982.

DESCRIPTION

The claims are underlain by generally flat-lying sandstones of the Thelon Formation of Donaldson (1965, 1969). The depth to the Archean/Aphebian basement in the area has been estimated at 175 metres (Overton, 1979). Basement gneiss occurs 10 km southeast of the MARY claims. More than 80% of the permits are covered by glacial till and sand.

CURRENT WORK AND RESULTS

1982:

Two large sandstone outcroppings near the center of the claims are radioactive. The Thelon Formation-basement unconformity was mapped to the east, along the east shore of Mary Lake (Fig. 6-2).

Lake-sediment sampling of the MARY claims and adjacent area yielded moderately anomalous results. Reconnaissance boulder prospecting and sampling disclosed radioactive boulders of sandstone near outcrop and probable subcropping source rock.

A grid was established in the northwest part of the MARY 5 claim and scintillometer, magnetometer, VLF EM-16 surveys and soil sampling were done to test the area.

DUNKEL LAKE PROJECT

DUB CLAIMS — Uranium

PNC Exploration (Canada) Co. Ltd. — 65 M/2

Box 11571 — $63^{0}07$'N,$102^{0}48$'N

3060 - 650 W. Georgia St.

Vancouver, B.C., V6B 4N8

REFERENCES

Eade (1981b); Gibbins (1984); Laporte (1974, 1979); Wright (1967).

DIAND assessment reports 081801, 019962, 061560.

PROPERTY

DUB 1-6. 65 M/2

LOCATION

The claims are 30 km west of the west side of Dubawnt Lake. They are immediately north of Urangesellschaft Canada Ltd.'s LYNN claims and south of the Clarke River that defines the southern boundary of the Thelon Game Sanctuary.

HISTORY

NTS area 65 M/2 was previously protected by Prospecting Permit 128 granted to Canadian Delhi Oil in 1969 (Laporte, 1974), Permit 373 of Urangesellschaft Canada Ltd. from 1976 to 1978 (Laporte, 1979) and Permits 715 and 751 of Hudson's Bay Oil and Gas Ltd. from 1980 to 1983 (Gibbins, 1984). The DUB 1-6 claims were staked in February, 1984.

DESCRIPTION

The project area lies along the eastern boundary of the southeastern Thelon Basin, just south of the Thelon Game Sanctuary. Basement rocks of Archean (Eade, 1981b) or Aphebian (Wright, 1967) age underlie the eastern half of the claim group, while shallow-dipping Thelon Formation sandstone and conglomerate cover the eastern half. North-northwest-trending diabase dykes are the youngest rocks in the area.

Radioactive zones of hematized sandstone were found on the adjacent LYNN claims by Urangesellschaft Canada Ltd. in 1980 (Gibbins, 1984, p. 210).

CURRENT WORK AND RESULTS

In 1983 PNC Exploration (Canada) Ltd. did reconnaissance exploration work in the 'Dunkel Lake' area, west of Dubawnt Lake. The work included magnetic, EM and scintillometer surveys, boulder prospecting, geological mapping, and rock, overburden, lake bottom and stream sediment sampling. Petrographic work and aeromagnetic

interpretation were contracted out to consulting firms.

The results of this work are confidential until May, 1987.

PROSPECTING PERMITS 776 AND 777

CROFT CLAIMS	Uranium
PNC Exploration (Canada) Co. Ltd.	75 H/16; I/1
Box 11571	62°N,104°15'W
3060 - 650 W. Georgia St.	
Vancouver, B.C., V6B 4N8	

REFERENCES

Dahlkamp (1978); Gibbins (1983b, 1984); Padgham and others (1978); Wright (1967).

DIAND assessment report 081619.

PROPERTY

Prospecting Permits 776 and 777	75 H/16
CROFT 1-29	75 I/1
CROFT 30-35	75 H/16

LOCATION

The claims and permits are in the vicinity of Croft and Foster Lakes at the southwestern tip of the Thelon Basin (Figs. 6-2, 6-7), some 200 km southwest of Dubawnt Lake and 500 km east-southeast of Yellowknife.

Foster Lake lies within the western of the two adjacent permits and CROFT 1-29 lies between permits 776 and 777 to the south and Croft Lake to the north.

HISTORY

Prospecting Permits 776 and 777 were granted in January,1981. The adjacent CROFT 1-23 claims in 75 I/1 were added in April,1979 and the remaining CROFT claims were added later in the same year. NTS area 75 I/1 was previously covered by Prospecting Permit 152 (Bow Valley Land Co. Ltd.) in 1969-70 (Padgham and others, 1978) and 379 (Urangesellschaft Canada Ltd.) in 1976-78.

Urangesellschaft Canada Ltd. retained part of Permit 379 by staking the ROB and WAWA claims in 1978 (Fig. 6-3 and Gibbins, 1983b, p. 140-141). Two inliers of kaolinized and hematized regolithic basement rock were found in the bank of a stream in the northwest corner of the ROB group. On the WAWA group, kaolinized gneiss regolith with low-grade uranium is also exposed below the sub-Thelon Formation unconformity in a river valley known as Laurie's Canyon.

Following the acquisition of Prospecting Permits 776 and 777 by PNC Exploration (Canada) Ltd., Taiga Consultants Ltd. and Paterson Grant and Watson Ltd. were contracted to compile and interpret photo and aeromagnetic maps. In June, 1981, Kenting Earth Sciences Ltd. was contracted to conduct a combined airborne magnetic, electromagnetic and radiometric survey of some 676 sq. km covered by the permits and claims. Kenting also did a heliborne radiometric survey that detected numerous uranium anomalies (Gibbins, 1984). PNC Exploration (Canada) Ltd.

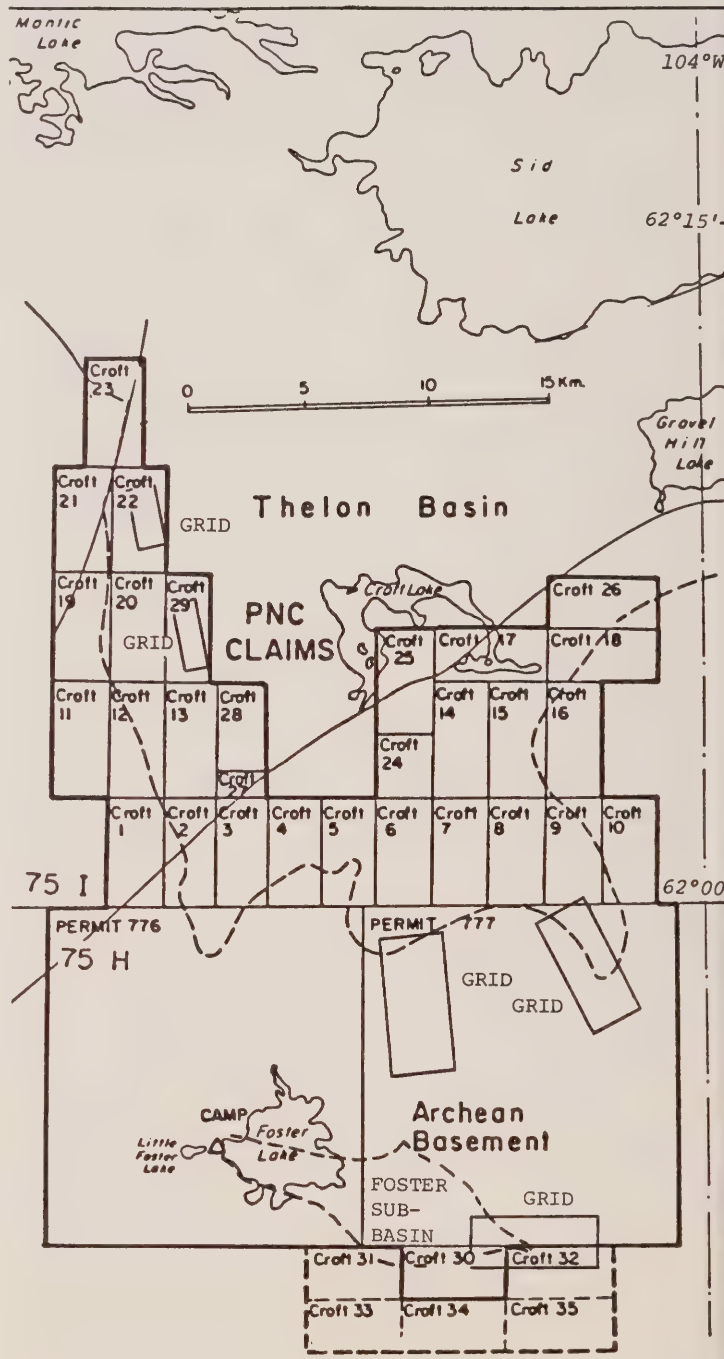


FIGURE 6-7: PNC Exploration (Canada) Ltd. - Croft Lake - Foster Lake claims and permits

geologists did reconnaissance geological mapping, boulder prospecting and lake-sediment sampling surveys. Later, a detailed grid was set up on the CROFT 22 claim. Subsequently, ground geophysical surveys (magnetic, EM and radiometric) and a soil geochemical survey were done on the grid. Several minor soil and radiometric anomalies were detected.

DESCRIPTION

The area covers the extreme southwest tip of the Thelon Basin (Wright, 1967 and Fig. 6-7). The favorable sub-Thelon Formation unconformity varies from a few metres to several hundred metres deep on the northern group of CROFT claims in 75 I/1. The permits (75 H/16) are extensively covered with overburden. Glacial landforms include eskers, pitted outwash, strandlines, crevasse-fillings, dead-ice moraine and ground moraine. Sandy drift, probably derived from the underlying Thelon sandstone, thickens towards the north and is probably wind modified. Joint and fault patterns in bedrock can be seen as lineaments through the thinner glacial overburden.

Targets for uranium exploration in the area include: (i) unconformity vein-type deposits within basement, Aphebian metasediments and Dubawnt Group rocks (Dahlkamp, 1978); (ii) stratabound deposits in Lower Proterozoic metasediments; (iii) detrital deposits in Lower Proterozoic pyritic quartz-pebble conglomerates; and (iv) disseminated or pegmatitic deposits in basement rocks.

CURRENT WORK AND RESULTS

1982:

During the 1982 field season, PNC Exploration (Canada) Ltd. completed reconnaissance mapping and boulder prospecting. Anomalously uraniferous lake sediments were analyzed for thorium and lead and uraniferous Thelon Formation samples were analyzed for P_2O_5. Several additional grids and minigrids were constructed (Fig. 6-7). Follow-up work on these grids comprised 1:5,000 scale mapping, boulder prospecting and magnetometer, EM-16, scintillometer, radon detection and soil sampling surveys. More detailed surveys were done on minigrids.

a) Geology

The erosional trace of the sub-Thelon Formation unconformity was prospected and mapped across the property. This included the discovery of an outlier of Thelon Formation sandstone, 'the Foster Sub-Basin', east of Foster Lake (Fig. 6-7) and about 15 km south of the previously mapped limits of Thelon Formation sandstone (Wright, 1967). The presence of sub-Thelon Formation regolith and northeast-trending fault systems and paragneiss belts favour the discovery of unconformity related uranium deposits, despite the lack of graphite conductors and the scarcity of radiometric anomalies with U/Th ratios greater than unity. A volcanic vent breccia, discovered on Croft 22, suggests the possibility of finding Christopher Island - type uranium-copper - silver-gold-selenium deposits (Miller, 1980, p. 10).

b) Magnetic surveys

Airborne and ground magnetometer surveys were useful in delineating the trace of the unconformity.

c) Electromagnetic surveys

The lack of deep Tridem AEM conductors was explained by a lack of graphite in the bedrock. Ground EM-16 surveys helped trace the unconformity on grids in Prospecting Permit 777.

d) Radiometric surveys

Potassium- and thorium-channel radiometrics proved to be a useful mapping tool, as basin and basement rocks are characterized by high Th- and K-channel radiometric signatures. Uranium anomalies are rare. Some radiometric anomalies correlate with high surface radon flux.

e) Overburden (soil) geochemical surveys

Soil sampling surveys on grids in Prospecting Permit 777 outlined several areas which were anomalous (i.e. greater than 10 ppm U; U/Th generally greater than 1) and slightly anomalous (i.e., 3 - 10 ppm U; U/Th generally less than 1). U/Th ratios exceeding unity are rare and the areas represented by the sample sites are generally small.

f) Radon techniques

Cartridges containing activated charcoal were buried for five to eight days and the amount of gamma radiation due to radon 222 and its daughter products was measured once thoron had reached equilibrium. Results from grids and minigrids are generally disappointing, suggesting that either the presence of continuous permafrost reduces radon 222 flux to surface or that these areas are not underlain by concentrations of uranium. There was good correlation with scintillometer survey data.

1983:

The permits and all the claims in NTS area 75 I/1 (CROFT 1-29) were allowed to lapse.

NONACHO BASIN

INTRODUCTION

The Nonacho Group is a conformable sequence of mainly continental sediments consisting of conglomerates, lithic sandstones (arkose) and shale (Table 6-3), that have been deposited in an intra-cratonic, fault-controlled basin. They appear to be Middle Aphebian in age and are comparable to the Martin Group of northern Saskatchewan. Basement rocks are mainly Early Aphebian to Archean granites and gneisses including numerous mylonite or cataclasite zones. A belt of Archean to Aphebian Tazin Group paragneisses extends northward from Saskatchewan into the Hill Island Lake area (Mulligan and Taylor, 1969; Bostock, 1984). Diabase dykes represent the last Precambrian events.

The geology of the Nonacho Lake area has been summarized by McGlynn and others (1974), and McGlynn (1970a, 1971a). Uranium-bearing minerals associated with granitic rocks include pitchblende and allanite. Within the Nonacho Group uranium is found as pitchblende in narrow fracture fillings and small veinlets in quartz stockworks, commonly in deformed rocks.

Mineral exploration in the area has been sporadic over the years. Renewed interest in uranium in 1976 coincided with the release of Geological Survey of Canada Open Files 324, 325 and 326 (Hornbrook and others, 1976) which reported the results of lake sediment geochemical surveys, and the release of airborne gamma-ray survey Map 37075G (G.S.C. Uranium Reconnaissance Program, 1976). These results, combined with an earlier airborne radiometric study (Darnley and Grasty, 1972) and promising geology, resulted in considerable staking and exploration since 1976.

The 1979 level of exploration in the Nonacho area was higher than in any previous year, and several companies carried out major projects. This work included diamond drilling, airborne geophysical surveys, geological mapping and detailed systematic prospecting involving expenditures of 2-3 million dollars. From 1980 to 1982, exploration tapered off, with only Uranerz Exploration and Mining Ltd. and PNC Exploration (Canada) Ltd. working on major programs. Summaries of the 1980-81 work are given in Gibbins, 1984.

Exploration was mainly for unconformity related uranium deposits similar to those found in northern Saskatchewan (e.g. Key Lake, Dahlkamp, 1978, 1979). Exploration techniques, which emphasised geophysical prospecting (Patterson and others, 1979), lake water and sediment geochemistry, and boulder tracing, are

TABLE 6-3: STRATIGRAPHIC UNITS - NONACHO BASIN (from McGlynn, 1978)

NONACHO GROUP	
Nam	Lithic sandstone, arkose or feldspathic sandstone, with interbeds of grey, greenish grey or, more rarely, red mudstone, or with beds of mudstone chip conglomerates or reworked mudstone chip conglomerates.
Nap	Lithic sandstone, arkose or feldspathic sandstone with single-pebble bands or reworked pebble bands.
Nac	Lithic sandstone, arkose or feldspathic sandstone with interbeds of polymictic conglomerate or, near the base of the sequence, oligomictic conglomerate.
Ncq	Polymictic conglomerate with interbeds of lithic sandstone, and rarely, mudstones. The unit consists of a large number of fining-upward cycles of conglomerate with clasts of decreasing size upwards in the cycle grading to sandstones and finally, mudstones. This conglomerate is characterized by a significant clast component of white weathering, light grey metaquartzite in addition to a variety of granitic rocks. This unit occurs at several stratigraphic horizons within the sandstone units.
Nca	Polymictic conglomerate with interbeds of arkose or lithic sandstone in fining-upward sequences. Clasts include a variety of granitic rocks with minor amounts of extrusive or hypabyssal intrusive feldspar porphyry, amphibolite, vein quartz, shale or slate, and mylonite or sheared granitic rocks. White quartzite clasts are rare.
Ncb	Basal oligomictic conglomerate and breccia comprising angular to subangular clasts of basement rocks in a lithic sandstone matrix. This unit rests on basement and grades upward into an arkose or lithic sandstone containing thin beds of oligomictic conglomerate or scattered, large (up to 6 inches) angular clasts of basement rock. Away from the margin of the basin these conglomerates tend to become polymictic.
BASEMENT B	Migmatites, granitic gneisses and massive granitic rocks; B_s sheared or brecciated basement rocks; flaser gneisses; B_m mylonite zones in basement rocks.

identical to those used in northern Saskatchewan. However, there is inconclusive evidence for a regolith below the sub-Nonacho unconformity.

Numerous other types of uranium occurrences, particularly Beaverlodge-type pitchblende veins related to mylonite, fine-grained mafic dykes and albitite host rocks, have been found in the area, but so far none have shown economic potential.

Bostock (1982) recently remapped the basement rocks south and southwest of the Nonacho Basin in NTS 75 C and L. Aspler (1985) has mapped and studied the structure and sedimentation of the Nonacho Basin sediments.

NONACHO LAKE PROJECT

Uranerz Expl'n and Mining Ltd.	Uranium
#204, 229-4th Avenue South	75 C/13,14; F/3,6
Saskatoon, Sask., S7K 5M5	$60^{0}50'$-$61^{0}20'$N
	$109^{0}10'$-$109^{0}30'$W

REFERENCES

Gibbins (1981, 1983a,b, 1984); Mulligan and Taylor (1969); Taylor (1971).

DIAND assessment reports 081503, 081601 and 081719.

PROPERTY

Numerous claim groups including:

JIM	1-39	75 F/6
VIP	1-12	75 F/6
URY	1-12	75 F/11
BLUE	1-3	75 F/15

LOCATION

The Nonacho Lake project encompasses an area of 25,000 square kilometres southeast of Great Slave Lake. However, since 1979 most effort has been confined to a cataclastic zone extending from Heron Lake to the Thoa River. The center of the area is 175 km northeast of Fort Smith and 300 km southeast of Yellowknife.

The locations of specific prospects are given in Figure 5-8 of Gibbins (1984, p. 236).

HISTORY

Uranerz Exploration and Mining Ltd. began reconnaissance exploration for uranium in the Nonacho Basin in 1977. The contact between Middle Aphebian Nonacho Group sediments and basement granites and gneisses was the main exploration target. Airborne radiometric surveys, reconnaissance mapping, prospecting and some detailed work was completed in 1977 (Gibbins, 1981).

In 1978, Uranerz Exploration and Mining Ltd.'s exploration team completed their reconnaissance survey of the Nonacho Basin and discovered, staked and examined several uranium showings. Questor Surveys Ltd. was contracted to do airborne Input-EM and magnetic surveys and Sander Geophysics Ltd. to do airborne VLF-EM and magnetic surveys. Detailed surficial and bedrock studies, soil geochemistry, trenching and sampling were done near showings on the various claim groups, (Gibbins, 1983a).

In 1979 more than 3,000 m of drilling was done in a small area near the apex of a uraniferous boulder train at 'Mosquito Gulch', just west of 'Octopus Lake' (MG 21-28, $60^{0}58'$N, $109^{0}19'$W) where disseminated uraninite and pitchblende occur within metasomatic albitite. The mineralization was generally low grade and discontinuous; the best intersection returned 0.356% U_3O_8 over 7.3 m.

IP/resistivity surveys were completed at Mosquito Gulch and Heron Lake and a ground magnetometer survey at Mosquito Gulch. These geophysical surveys did not outline the mineralized zones.

Detailed mapping, radiometric prospecting and geochemical surveys were done between Heron Lake and Thoa River. Over 1,100 lake-water and sediment samples were collected and analyzed at a sample density of one sample per square km. Anomalies greater than 50 ppm U_3O_8 in lake-sediments, and 0.8 ppb U_3O_8 in lake-waters were identified in numerous locales, several of which correspond to previously discovered radioactive zones. However, there were no anomalies in the Mosquito Gulch-Octopus Lake area. The best results were obtained in the Smudge Lake area (Gibbins, 1983b, p. 152).

In 1980 Geophysical Surveys Inc. was contracted to fly a combined radiometric and magnetic survey of the cataclastic zone between Heron Lake and the Thoa River. This survey consisted of 2771 line-km with a line spacing of half a kilometre. Uranium showings tend to coincide with magnetic lows, possibly due to retrograde greenschist facies metamorphism in these areas.

Dr. Peter Fischer was contracted to do a geologic and petrographic study of the cataclastic zone. His report contributed to the metamorphic and structural interpretation of the area.

A multi-element lithogeochemical study, using chip samples collected from selected diamond drill core of the Mosquito Gulch area, was done to deter-

mine if uranium is associated with other elements that may be used as pathfinders for exploration. Of particular interest is the association of uranium with sodium, since albitite is commonly associated with uranium in the Nonacho Lake area.

Detailed mapping and radiometric survey traverses between Heron Lake and Thoa River outlined approximately 25 radioactive outcrops in the Smudge/Dali Lakes area. More than 4400 m were drilled on the Mosquito Gulch (Octopus Lake), Heron Lake, Ski Hill and Smudge prospects. A summary of this work is given in Gibbins (1984, p. 235-238).

Metallurgical tests for uranium leachability were done on Mosquito Gulch core at the company's laboratories in Germany.

The 1981 reconnaissance mapping was focused in four areas: between Powder and Anderson Lakes, south of the Thoa River, and east and west of Kidder Lake. Prospecting was carried out on the Stewart Lake, Jerome Lake and Shamie Lake showings. Prospecting in the Shamie Lake area east of Kidder Lake outlined several uraniferous zones and boulder fields. The surficial deposits of the Smudge area were mapped and the uraniferous boulder fan and its probable source were defined. Polonium 210 and uranium were analyzed in soil samples from Mung Arm, Smudge Lake and Heron Lake. Trenching and sampling were done at Smudge, Mung Arm, Mosquito Gulch, Ski-Hill and the Shamie II showings.

Studies of mineralogy, petrology and geochronology were undertaken and bulk samples from Mosquito Gulch and Mung Arm were shown to be amenable to radiometric ore sorting, with recoveries of 81 and 90% respectively.

The 1980 airborne radiometric and magnetic survey of the cataclasite zone was interpreted to select radiometric anomalies to be tested in 1982. The magnetic surveys show the area is transected by three major joint sets trending north, east and northeast. Magnetic surveys are also useful in outlining lithologic units, but not the economically significant albitized units.

DESCRIPTION

The basement rocks of the area are composed of fine grained to pegmatitic granitic rocks, paragneiss and diabase. Isolated remnants of what are believed to be Lower Aphebian sediments, possibly related to the Tazin Group metasediments and paragneisses of the Hill Island Lake and Tazin Lake areas to the south, occur in this basement. However, these remnants are tightly folded and extremely sheared, making correlations rather dubious.

When not faulted, the base of the overlying Nonacho Group sediments is normally a basal conglomerate resting unconformably on the basement. Granite and gneissic boulders predominate at the base. The Nonacho Group is folded and faulted along northeast trends.

In the southeast corner of the basin, a mappable unit referred to as the cataclastic zone is made up of both the Archean basement and the Lower Aphebian metasediments. As the name suggests, this zone was structurally formed and consists of quartz-feldspar cataclasite, feldspar cataclasite, banded mylonite and massive chloritic lenses. The cataclastic zone shows retrograde metamorphism from lower-amphibolite to greenschist facies. Hydrothermal activity, mainly restricted to the cataclastic zone, resulted in the deposition of several small pitchblende showings.

Mulligan and Taylor (1969) and Taylor (1971) published the most recent geologic maps that are available.

Recent exploration of the Nonacho Lake project has been for uranium in albitites, which can be low-grade (less than 1000 ppm) - large tonnage deposits like those found in the USSR or high-grade (1700 ppm) - medium tonnage deposits like the Gunnar deposit of northern Saskatchewan, 170 to 200 km to the south.

CURRENT WORK AND RESULTS

Uranerz Exploration and Mining Ltd.'s 1982-83 work consisted of follow-up work in selected areas, mainly geological and geophysical surveys and trenching. From the Powder Lake base camp, small areas of the BLUE, URY, VIP and JIM claims were explored in 1982 and the VIP 3 claim in 1983.

NONACHO LAKE PROJECT

JIM 1,3,8,9,11-13,26	Uranium
VIP 1-12	75 F/3
	$61^{o}13$'N,$109^{o}20$'W

REFERENCES

Gibbins (1983a); Taylor (1971).

DIAND assessment report 081601.

LOCATION

The JIM claims are 5 km east and southeast of Naskethey Lake. They cover the eastern boundary of the southeastern Nonacho Basin between Heron and

Powder Lakes. The VIP 1-12 claim group forms a 6 by 18 km area that borders the JIM claims on the west and shares a common northeast corner with Hatchet Lake (Figs. 6-8, 6-9).

HISTORY

The claims were staked in 1978 to protect a number of radioactive showings and boulders of chloritized metasediment.

DESCRIPTION

The claims include the east limb of a crescent-shaped outlier of Nonacho Group metasediments. This limb extends from Naskethey Lake to Powder Lake, (Taylor, 1971). The claims are underlain by Archean/Lower Aphebian basement composed mainly of metasediments with gradational contacts into gneisses and granitic gneisses. Superimposed on the metasedimentary basement are mylonitization and cataclasis along fault zones together with partly to intensely albitized rocks. Most of the radioactive occurrences encountered were associated with albitized metasediments while some were associated with the Nonacho Group quartzites.

CURRENT WORK AND RESULTS

Geological mapping was done in selected areas along traverses across the Nonacho Group/basement contact, along structures and in areas of basement lithologies. Ground radiometric surveys were done in connection with the geological mapping to locate radiometric anomalies recorded by a 1980 helicopter-borne survey. Of 39 anomalies investigated, 11 were associated with uraniferous zones, while 28 either could not be found or were interpreted to be the result of high background or topographic effects.

Trenches were blasted to probe two radioactive anomalies on the JIM 11 claim, the Deka North and Deka South showings. The anomalies are in Nonacho Group quartzite that has been bleached (albitized) and partly hematized in an east-northeasterly trending zone 50 m to 80 m wide and 150 m long. At the Deka North showing, about forty thousand cps (URTEC) was detected in a 20 cm by 150 cm heavy mineral band that was blasted away upon trenching. Radioactivity in a limonite-stained fracture 3 m south of the heavy mineral band increased from 2500 cps to 3000 cps after trenching. At the Deka South showing, 50 m south of Deka North, spot highs of up to 1500 cps were detected. Trenching revealed that the alteration zone forms a 25 to 100-cm-thick crust overlying reddish to purple quartzite that is cut by narrow (50 mm) quartz veins, some of which contain minor carbonate. Radioactivity in one vein was 3 to 6 times background.

NONACHO LAKE PROJECT

VIP 3

Uranium
75 F/3
$61^{0}13'$N,$109^{0}28'$W

REFERENCES

Gibbins (1984).

DIAND assessment report 081719.

LOCATION

The VIP 3 claim is 1 to 6 km west of Hatchet Lake (Figs. 6-8, 6-9).

HISTORY

The VIP 3 claim was recorded on October 11, 1978.

DESCRIPTION

The geology of the VIP 3 claim is shown in Figure 6-8. More than 75% of the claim block is underlain by basement lithologies consisting of porphyroblastic

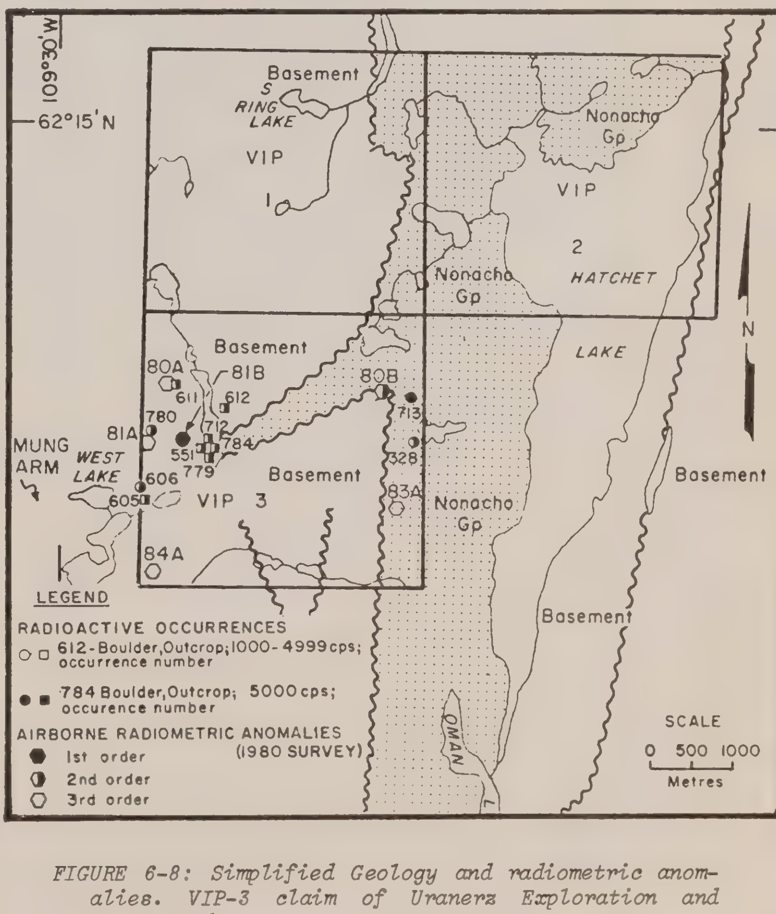


FIGURE 6-8: Simplified Geology and radiometric anomalies. VIP-3 claim of Uranerz Exploration and Mining Ltd.

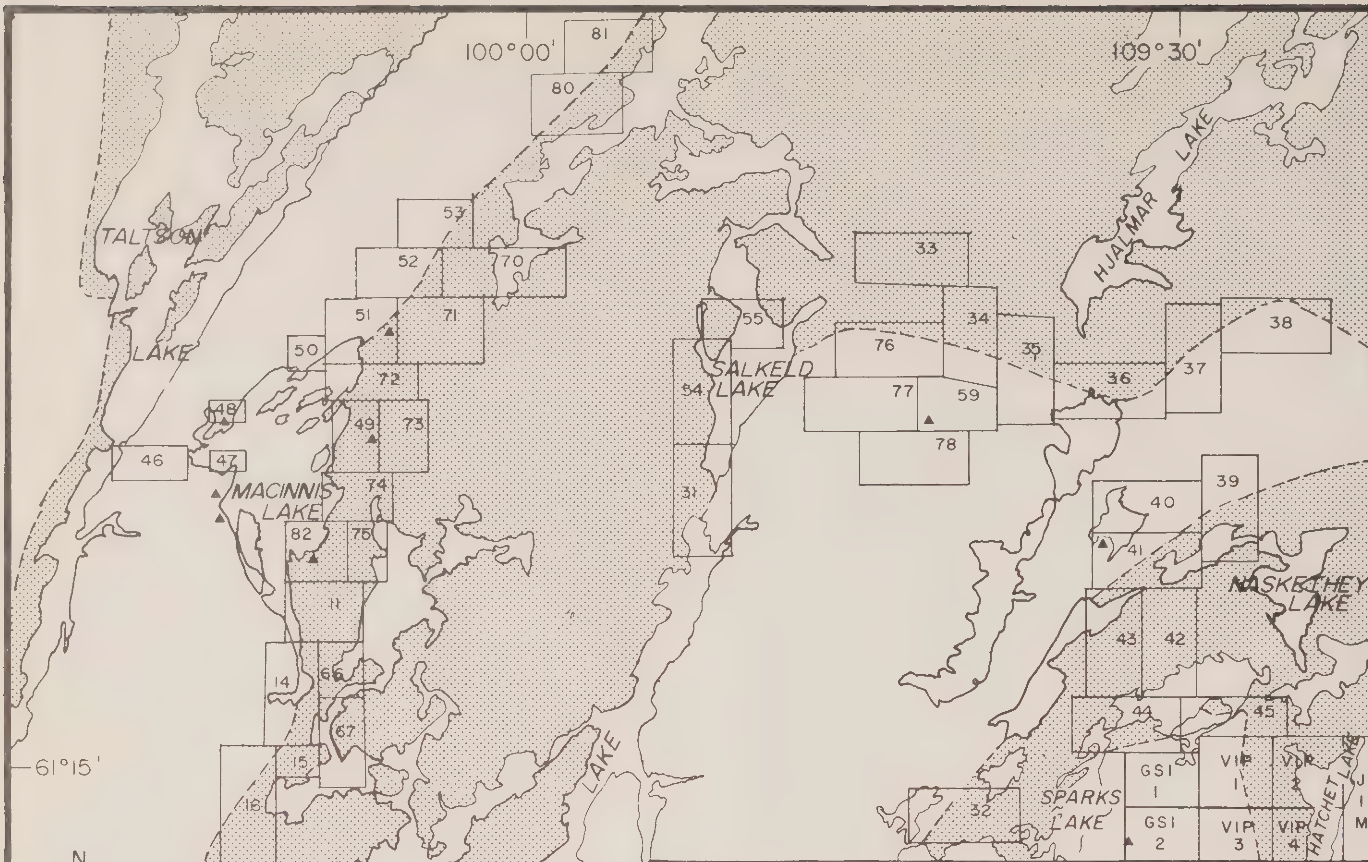
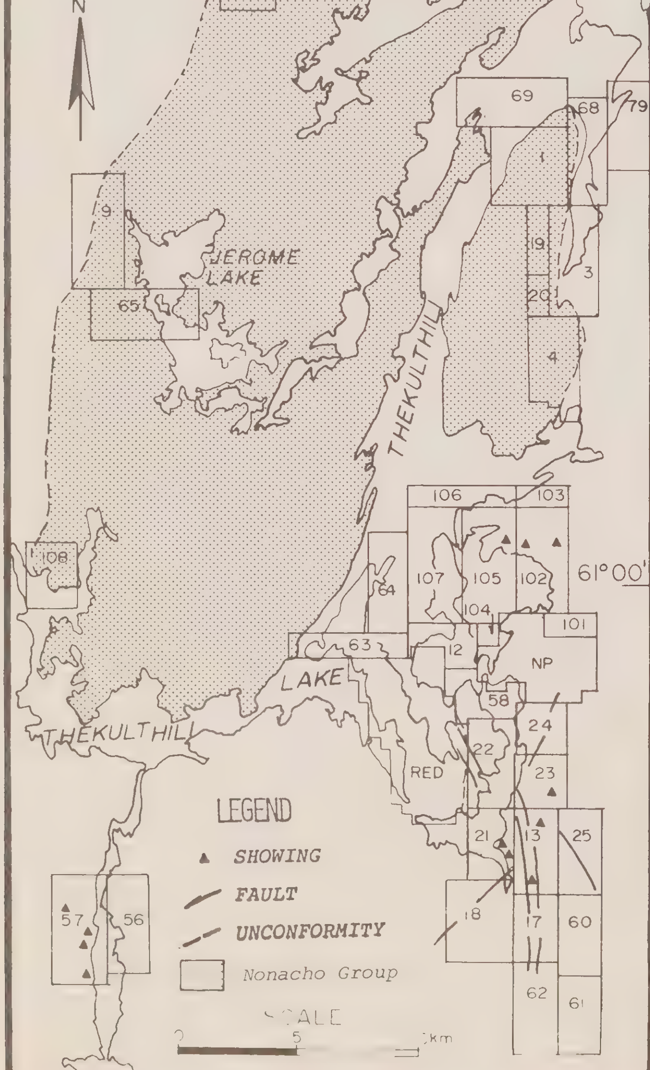



FIGURE 6-9: PNC KULT claims - Thekulthili Lake.

albitite in a chloritic matrix or banded albitite/chlorite grading into medium-grained granites to granitic gneisses towards the northwest of the claim. Cataclasized and mylonitic sequences with a high chlorite content are seen in outcrops along the north and northeast-trending fault zones. The basement lithologies have been affected by retrograde metamorphism and albite metasomatism and generally average from 70 to 125 cps background (SRAT-SPP2 scintillometer. Radioactive showings on VIP 3 are about 1800 m east of and along strike of a similar albitized and cataclasized sequence which hosts the Mung Arm radioactive showings to the southwest, (Fig. 6-8 and Gibbins, 1984, p. 238).

Nonacho Formation sediments, consisting of sandstone, arkose and minor conglomeratic sequences, unconformably overlie the basement lithologies, but the contact was not seen in outcrop within the VIP 3 claim. Most contacts appear to be fault contacts which are now overburden or swamp covered.

CURRENT WORK AND RESULTS

1983:

Geological mapping and radiometric surveying in the 1983 field season investigated structures and lithological relationships on the VIP 3 claim block. Two radioactive occurrences consisting of spot highs registering up to 12,000 cps were found in outcrops

of porphyroblastic albitite in a chlorite matrix. The radioactive occurrences discovered on VIP 3 appear to be lithologically and structurally similar to the Mung Arm radioactive showings, 1800 m to the southwest.

Computer-assisted data processing and terrain classification of remotely-sensed Landsat imagery in the Mung Arm and the VIP 3 claim area did not detect a spectral signature characteristic of mineralization or albitization known to exist on the ground.

NONACHO LAKE PROJECT

URY CLAIMS - C.O. ISLAND — Uranium
75 F/11
61°32'30"N,109°18'W

REFERENCES

Gibbins (1983a).

DIAND assessment report 081601.

PROPERTY

URY 2 — 75F/11

LOCATION

The URY claims are on the east side of Hjalmar Lake and include the north part of a prominent island unofficially called C.O. Island.

HISTORY

The claims were staked in 1977 when radioactivity was found in narrow fractures in arkose and argillite. Associated hematite and anhydrite suggest a hydrothermal origin (Gibbins, 1983a).

DESCRIPTION

The area is underlain by folded Nonacho conglomerate and arkose.

CURRENT WORK AND RESULTS

1982:

A trench was blasted to expose a 'hot spot' in a highly contorted chlorite-filled fracture in arkosic quartzite. A chip sample across the 3.0 m length of the trench assayed 0.031% U_3O_8. A whole-rock geochemical sample showed a content of 9.86% Na_2O and indicates that sodium metasomatizing solutions penetrated the Nonacho sediments in this area. C.O. Island lies within 1 km of the basement contact near previously described albitite uranium occurrences drilled by Pan Ocean. The island is at the nose of a large northeast-trending syncline which would account for the contorted chlorite lenses.

NONACHO LAKE PROJECT

BLUE CLAIMS - BLUE LAKE — Uranium
75 F/15
61°58'N,108°50'W

REFERENCES

Gibbins (1983a).

DIAND assessment report 081503.

PROPERTY

BLUE 1-3 — 75 F/15

LOCATION

The claims are centered on Blue Lake, a small lake about 7 km northwest of Cobb Lake.

HISTORY

The claims were staked following the discovery of a uraniferous boulder fan in 1977-78. Surficial geology mapping by Bayrock Surficial Geology Ltd. outlined a boulder fan of more than 100 boulders of granite and granite gneiss. These boulders registered more than 1800 cps (SPP-2 scintillometer) and contained 0.055 to 0.766% U_3O_8. However, the small boulder fan could not be traced very far and roundness of boulders suggested a source less than 300 m in the up-ice direction (065°).

DESCRIPTION

The Archean basement on the east side of Blue Lake consists of granitic gneisses and paragneisses which form high rounded hills up to 200 or more feet above the lake level. The gneisses are well foliated and generally trend 025 to 035° with dips to the west at 35 to 50°. The gneisses consist mainly of quartz and feldspar with chlorite. Thin epidote-rich layers and cross-cutting veinlets as well as minor pyrite are also seen. Chlorite is the predominant mafic mineral and appears to be the retrograded remnant of biotites and amphiboles.

Nonacho Group sediments overlie the basement lithologies in the Blue Lake area and are believed to be in fault contact. However, the contact is covered by Pleistocene deposits.

CURRENT WORK AND RESULTS

Geological mapping failed to find additional radioactive boulders or outcrops. Magnetic and VLF/EM surveys indicate that favourable structures controlling uranium deposition may occur at the Nonacho/Basement contact but these structures are covered by Blue Lake. The limited extent and small

size of the uraniferous boulder fan indicate a small source area at or near the Nonacho/Basement contact.

The BLUE claims have lapsed.

THEKULTHILI LAKE PROJECT

PNC Exploration (Can.) Co. Ltd.	Uranium
Box 11571, Vancouver Centre	75 C/13,D/16,E/1,8
3060 - 650 W. Georgia St.	75 F/4,5,12
Vancouver, B.C., V6B 4N8	$61^{\circ}N, 110^{\circ}W$

REFERENCES

Bostock (1980, 1982); Donaghy (1977); Gandhi and Prasad (1980); Gibbins (1983a,b, 1984); Gibbins and others (1977); Henderson (1937, 1939a, 1983b); McGlynn (1966, 1970a, 1978); Mulligan and Taylor (1969); Taylor (1971).

DIAND assessment reports: 080170, 081564, 081727, 081728.

PROPERTY

RED 1-116; NP 1-63; KULT 1-82, 101-110.

LOCATION

The claims cover most of the Nonacho Group-basement unconformity in the Thekulthili Lake area (Fig. 6-9). This area is about 300 km southeast of Yellowknife and 160 km north of Fort Smith.

HISTORY

In 1977 Kenting Earth Sciences Ltd. carried out an airborne radiometric survey over the southern Nonacho Basin for PNC Exploration. The RED and NP claims were staked to protect anomalies detected by this survey. In 1978, additional reconnaissance lake-sediment and airborne radiometric surveys in adjacent areas led to the staking of the KULT claims. Detailed mapping and soil sampling were done in several areas of interest (Gibbins, 1983a).

The 1979 program included geochemical (lake sediment and soil) surveys, geologic mapping, ground radiometric and VLF-EM, airborne EM and additional staking (Gibbins, 1983b). Regional claim-block mapping and radiometric prospecting was carried out over most of the claims and a number of anomalous areas were identified for more detailed work. Most of the important anomalies are associated with fractures containing prominent hematite, minor pyrite-chalcopyrite and yellow uranium oxides. Geological work indicates that the Nonacho-basement contact is non-conformable, but affected locally by faulting.

Detailed geology, geophysical, soil geochemistry and/or radiometric surveys were done over grids cut on the NP, RED and KULT 12 and 13 claims. Uraniferous fractures were found in the basement igneous complex on grids F and G on KULT 13.

Thirty-two radiometric anomalies detected by the 1977 airborne survey were ground checked and Kenting Earth Sciences Ltd. did 1,800 km of airborne Tridem EM survey.

Work in 1980 included detailed claim mapping, radiometric, VLF-EM and geochemical surveys, trenching, a Track Etch survey and additional claim staking. Kenting Earth Sciences Ltd. did over 5000 line-km of airborne magnetometer, VLF-EM and radiometric surveys on behalf of PNC over the KULT 31-59 claims (Gibbins, 1984).

The 1981 exploration program for the South Thekulthili Lake Project consisted of claim block mapping, prospecting, regional radiometrics, geochemical and ground geophysical surveys, detailed grid surveys (geology, geochemical soil sampling and ground magnetics), blasting and trenching, 820 km of heliborne geophysical surveys of claim blocks KULT 18, 22-24 and 56-57 (Fig. 6-9), 3142 m of drilling (KULT 13 and RED 31) and staking new claims (KULT 60-64).

Detailed work on the grids included petrographic studies, rock geochemistry, mapping, soil sampling, lake-sediment sampling, scintillometer, VLF (Geonics EM-16), magnetometer and track-etch surveys (Gibbins, 1984).

Work on the North Thekulthili Lake Project (KULT 11,14-16,31-55 and 59) was mainly ground follow-up (prospecting, mapping and radiometric surveys) of a 1981 heliborne spectrometer survey (Gibbins, 1984).

DESCRIPTION

The oldest rocks in the Thekulthili Lake area are basement granites and gneisses of Archean to Aphebian age. These rocks are unconformably overlain by conglomerate, arkose and argillite units of the Nonacho Group of undefined Proterozoic age. The Nonacho and basement rocks have been faulted and folded along north-northeast-trending axes. The youngest rocks are undeformed diabase dykes.

The area is at the mutual corners of geological maps by Henderson (1939a), Mulligan and Taylor (1969), Taylor (1971) and Bostock (1982, 1984). McGlynn (1966 and 1978) mapped part of the claim area in detail, and Donaghy (1977) reviewed the geology of the Thekulthili Lake area and Gandhi and Prasad

(1980) the MacInnis Lake area. Bostock (1980, 1982); McGlynn (1970); and McGlynn and others (1974) have also discussed the geology of parts of the area.

CURRENT WORK AND RESULTS

1982:

In the summer of 1982, PNC Exploration (Canada) Ltd. intensified its exploration in the Nonacho Basin, employing 19 company and 17 contracted persons. The work is summarized in Table 6-4.

1983:

The work continued at an accelerated pace in the summer of 1983, as 18 company and 10 contracted personnel did a variety of exploration work (see Table 6-5).

Drilling

Several drilling programs were carried out in 1982-83. The two main areas of drilling are KULT 13 - southeastern Thekulthili Lake (spring 1982: 9 holes - 1821.5 m; summer 1982: 21 holes - 2358.7 m; and summer 1983: 11 holes - 1145.2 m) and KULT 49 and 51 - northeastern MacInnis Lake (summer 1982: 4 holes 700 m; spring 1983: 7 holes - 2001.8 m and summer 1983; 11 holes - 2670.5 m) (See Figs. 6-9 to 6-11).

TABLE 6-4: 1982 SUMMER WORK PNC EXPLORATION (CANADA) LTD. - NONACHO BASIN

1. Geological Survey	
Reconnaissance	68.3 km^2
Detailed	40.7 km^2
Detailed Grid/Mini Grid	16.3 km^2
2. Prospecting	
3. Heliborne Radiometric Survey	730 line kms
4. Ground Geophysical Survey	
VLF-EM	60 line kms
Total Field Magnetics	68.4 line kms
5. Track Etch Survey	337 cups
6. Soil Sampling	373 samples
7. Rock Chip/Core Sample Assay	706
Rock Chip (U, Th, Cu, Pb, Zn, Fe)	168
Core Samples	527
8. Thin Sections	184
9. Trenching (14 sites)	59 m^3
10. Drilling (25 holes)	
KULT 13, KULT 51	3064.4 m
11. Claim Staking	
8 claims (KULT 74-81)	62.3 km^2
(Total claims held - 81 claims)	616.35 km^2

For convenience the following descriptions of individual claim groups are classified into four geographic sub-areas: A) MacInnis Lake - Tronka Chua Lake, B) Thekulthili Lake, C) Salkeld Lake - Hjalmar Lake, and D) Sparks Lake - Naskethy Lake (Figure 6-9).

Several of the KULT claims have lapsed.

A) MACINNIS LAKE - TRONKA CHUA LAKE

KULT 11 and 14: $61^{o}17'N, 110^{o}12'W$
75 E/8

KULT 11 and 14 are east and south of the south end of MacInnis Lake and cover part of the western Nonacho-basement contact (Henderson, 1939a). Gandhi and Prasad (1980) described the Kult and Pyramid showings on KULT 11 and KULT 14 (Fig. 6-10) as veins in basement rocks. The 1980 work on these claims consisted of detailed geologic mapping and radiometrics, rock geochemistry, trenching and sampling.

Finely disseminated pitchblende, secondary uranium and copper sulphide minerals are present in quartz-rich mylonite discovered in KULT 11 in 1979. A second radioactive area with uranium-staining lies 75 metres to the northwest in a silicified zone at a

TABLE 6-5: 1983 SUMMER WORK PNC EXPLORATION (CANADA) LTD. - NONACHO BASIN

1. Geological Survey	
Reconnaissance	37.6 km^2
Detailed	31.2 km^2
Detailed Grid/Mini Grid	8.3 km^2
2. Ground Geophysical Survey	
VLF-EM	105.6 line km
Magnetics	35.5 line km
3. Radon Survey	
Track Etch Cup	259 cups
Emanometer RD 200	249 spots
4. Soil Sampling	
Soil	170 samples
Lake Sediment	42 samples
5. Trenching (10 Sites)	66.42 m^3
6. Drilling (22 Holes)	3,817.9 m
KULT 13 Area (11 holes)	1,145.2 m
KULT 49-52 Area (11 holes)	2,672.7 m
7. Rock Chip/Core Sample Assay - (U, Th)	
Rock Chips	249 samples
8. Thin Sections	98 samples
9. Claim Staking	
1 Claim (KULT 82)	6.3 km^2
Total claims held: 65 claims	470.79 km^2

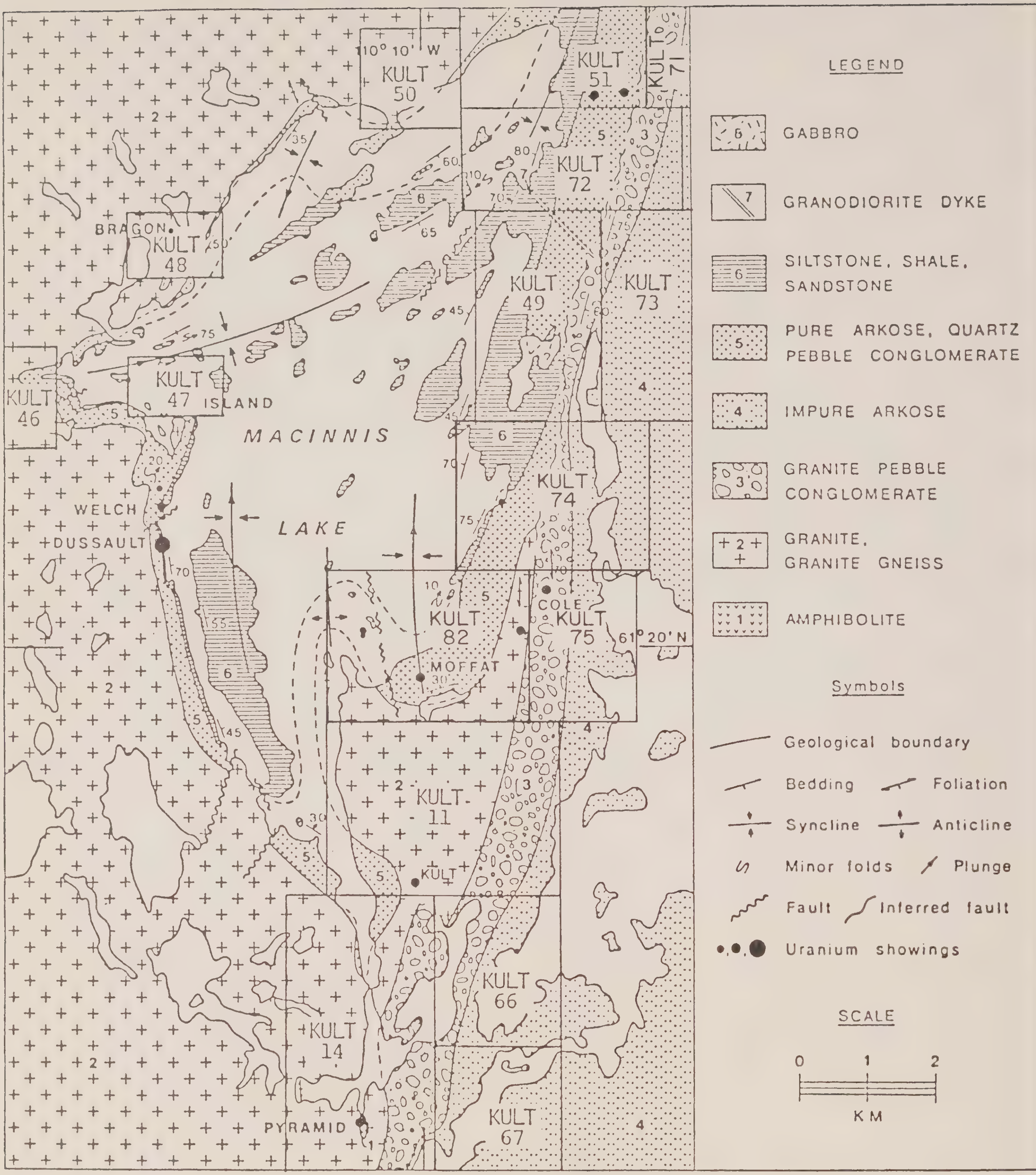


FIGURE 6-10: Geology and uranium occurrences of the MacInnis Lake area, District of Mackenzie (from Gandhi and Prasad, 1980).

dyke contact.

KULT 14 includes the Pyramid showing (Gandhi and Prasad, 1980; Thorpe, 1972), which was drilled and trenched in 1967 by Territorial Uranium Mines Ltd. Pitchblende and secondary yellow and green alteration products occur as veins in fractures and disseminations in a wide chlorite-rich shear zone (amphibolite?).

In 1982 trenching and prospecting were done on KULT 11 and 14. This work was concentrated in areas of copper-uranium-rich fractures found in silicified zones associated with altered areas of northwest-trending andesitic dykes.

KULT 46-48: 61°23'N,110°15'W
75 E/8

These claims are adjacent to the western shore of MacInnis Lake (Fig. 6-10), which also corresponds to the western margin of the main part of the Nonacho Basin. The claims are separated and partly enveloped by a group of leased claims owned by Scurry-Rainbow Oil Ltd., where drilling has outlined a zone estimated to contain 27,000 tonnes averaging 0.17% uranium (Gandhi and Prasad, 1980).

Uranium showings on KULT 47 (Island showing) and KULT 48 (Bragon showing) were extensively explored by Canadian Mining and Smelting Co. Ltd. in the late 1950's. Both areas contain a number of uranium showings related to veins and fractures in sheared and altered (chloritized) gabbroic instrusions (Gandhi and Prasad, 1980).

In 1982, 21 soil samples were collected from KULT 48 to determine the source of three anomalous lake sediment samples collected in 1981. It was concluded that the source of the uranium in the lake-sediment samples is to the north.

KULT 49-53, 70-73: 60°23'N,110°08'W
75 E/8

KULT 49 and 51 are adjacent to northeast MacInnis Lake (Fig. 6-9 & 6-10). The area is underlain by middle to late Aphebian Nonacho Group sediments near the western edge of the Nonacho Basin. The basement beneath the Nonacho Group is mylonitized and cut by two small dykes of altered diorite. A major north-northeast-trending fault has been inferred along the western contact of a conglomerate bed (Fig. 6-10).

This area was included in a fixed-wing airborne geophysical survey including magnetometer, EM and radiometrics which was conducted in the spring of 1980. The results prompted the staking of mineral claims KULT 49-53 in the summer of 1980. During 1981 these claims were geologically mapped and prospected on a regional basis. A heliborne radiometric survey was conducted and one trench was blasted on KULT 51. Mineral claims KULT 70-73 were staked in 1981, towards the end of the field season after favourable results were obtained from KULT 51 and 49.

Uranium was detected at surface in oligomictic conglomerate, quartz pebble sandstone, argillites and arkosic sandstone. Two types of showings occur in oligomictic conglomerate: a disseminated stratabound type and a fracture filling type. Several zones of disseminated uranium minerals were found on eastern KULT 49 and along the KULT 51-KULT 71 boundary during the 1981 and 1982 field seasons. Uranium minerals are not visible, but seem to be disseminated throughout the matrix of sheared conglomerate. The radioactive zones parallel the strike and dip of the foliation and are about the same distance east of the major NNE fault. Fracturing is common, but lithologic controls cannot be recognized. Pyrite is common in radioactive as well as non-radioactive zones. All of the surface showings are low grade. The maximum assay obtained was 0.13% U_3O_8 from a chip sample.

The second type of conglomerate-hosted anomaly is a fracture-filling type. Pitchblende, yellow secondary uranium oxides and galena are readily observed along fractures. Examples were identified in southern KULT 51, eastern KULT 52 and the Cole showing south of KULT 49 (Fig. 6-10).

In 1982 MPH Consulting Ltd. was contracted to do line cutting and magnetometer, vertical gradiometer and VLF EM surveys of a grid that trends north-northeast from southeast KULT 49 to northeast KULT 53. MPH Consulting Ltd. also did a heliborne radiometric survey of the entire block of claims. PNC Exploration (Canada) Ltd. staff did mapping, radiometric prospecting, and radon (Track Etch) and soil geochemical surveys of the gridded area. Several trenches and four drill holes (700 m) in southeast KULT 51 completed the 1982 program.

In the spring of 1983, an additional seven holes (2001.8 m) were drilled in the same area to test for uranium. Targets included the sub-Nonacho Group unconformity, a magnetic anomaly, a VLF EM conductor, the junction of faults, and extensions of radioactive

zones. Several holes intersected a zone of anomalous radioactivity.

During the summer of 1983, geological, geophysical and geochemical surveys as well as trenching and radon surveys were carried out north of the 1982 grid area. An additional 11 holes (2,670.5 m) were drilled in southeastern KULT 49 and 51, but the results were generally disappointing.

KULT 66 and 67 — 61°17'N,110°09'W
75 E/8

The claims lie 2 km east of the southern end of MacInnis Lake (Fig. 6-9). KULT 66 and 67 are underlain by Nonacho Group sediments consisting of oligomictic conglomerate in the west and grading into quartzose sandstone toward the east. The Nonacho Group sediments are in fault contact with basement rocks in the northwest corner of KULT 66.

No anomalous radioactivity was associated with the basal conglomerate or andesite dykes on the claims. Radiometric readings on outcrops ranged from 75 cps (SPP2 scintillometer) on conglomerate and sandstone to 150 cps on shaley units.

KULT 70-73 — 61°25'N,110°05'W
75 E/8

These claims were staked in 1981 after favourable results had been obtained on the neighbouring KULT 49 and 51 claims. The area is mainly quartzose to subarkosic sandstone. No uranium minerals were found in 1982, although several low-priority radiometric anomalies were recorded.

KULT 80 and 81: — 61°30'N,110°W
75 E/5,8,9,12

The KULT 80 and 81 claims are on the west side of Tronka Chua Lake, 10-20 km north of KULT 70 and along strike with the major fault and anomalous zones found on KULT 49 and 51. Zones of mylonite are common in the basement gneisses that underly the northwestern half of the claims. The basement-Nonacho Group contact is a fault surface.

Prospecting identified 21 radioactive anomalies, all but one in basement rocks. Follow-up Track Etch, soil geochemistry and VLF-EM surveys failed to establish any continuity to the showings or indicate additional target areas.

KULT 74,75,82: — 61°20'N,110°10'W
(1983) — 75 E/8

The claims are on the western margin of the main body of Nonacho Group sediments. The southeast shore of MacInnis Lake runs through the western part of the area.

Uranium showings in the claim area have been divided into four types based on their host rock and mode of occurrence as follows:

1) Showings that occur as stockwork systems of veins in N-S trending mylonite zones.

2) Showings that occur as stockwork-like veins in basal oligomictic conglomerate (Cole Prospect, see Figure 6-10 and Gandhi and Prasad, 1980).

3) Sporadic uranium minerals in fractures or disseminated within basement rocks.

4) Low-grade showings associated with dark, heavy mineral layers in the quartz pebble sandstone unit of the Nonacho Group (Moffat Showing).

Type 3 and 4 anomalies are not considered primary targets in this area because they occur sporadically, lack continuity and are generally low grade.

Numerous type 1 anomalies have been mapped in the mylonite. The host rock is mylonite exhibiting various stages of cataclasis and relicts of psammitic gneiss. Pitchblende is present in northerly to north-northeasterly trending, vertical to sub-vertical veins. Associated minerals in decreasing order of abundance are chlorite, hematite, calcite, pyrite, arsenopyrite and malachite.

The Cole prospect in oligomictic conglomerate of northwestern-most KULT 75 is a type-2 deposit. It was formerly known as the BM claims (Gibbins and others, 1977, p. 75 and Gandhi and Prasad, 1980).

Pitchblende and secondary yellow uranium minerals are found in fractures and are closely associated with calcite and to a lesser extent with hematite. Gold is associated with the uranium (Shell Canada Resources Ltd. - DIAND assessment report 080170).

An integrated geological, geophysical (magnetics, VLF EM and radiometric) and geochemical (Track Etch, soil samples and radon gas) program was carried out in 1983.

B) THEKULTHILI LAKE

KULT 13, 23 and 24: 60°55'N,109°58'W
75 C/16

The KULT 13, 23 and 24 claims are immediately west of the southeasternmost tip of Thekulthili Lake (Fig. 6-9). This area contains Nonacho Group sandstone, narrow andesite dykes, mylonite and basement granite, diorite and paragneisses (Fig. 6-11).

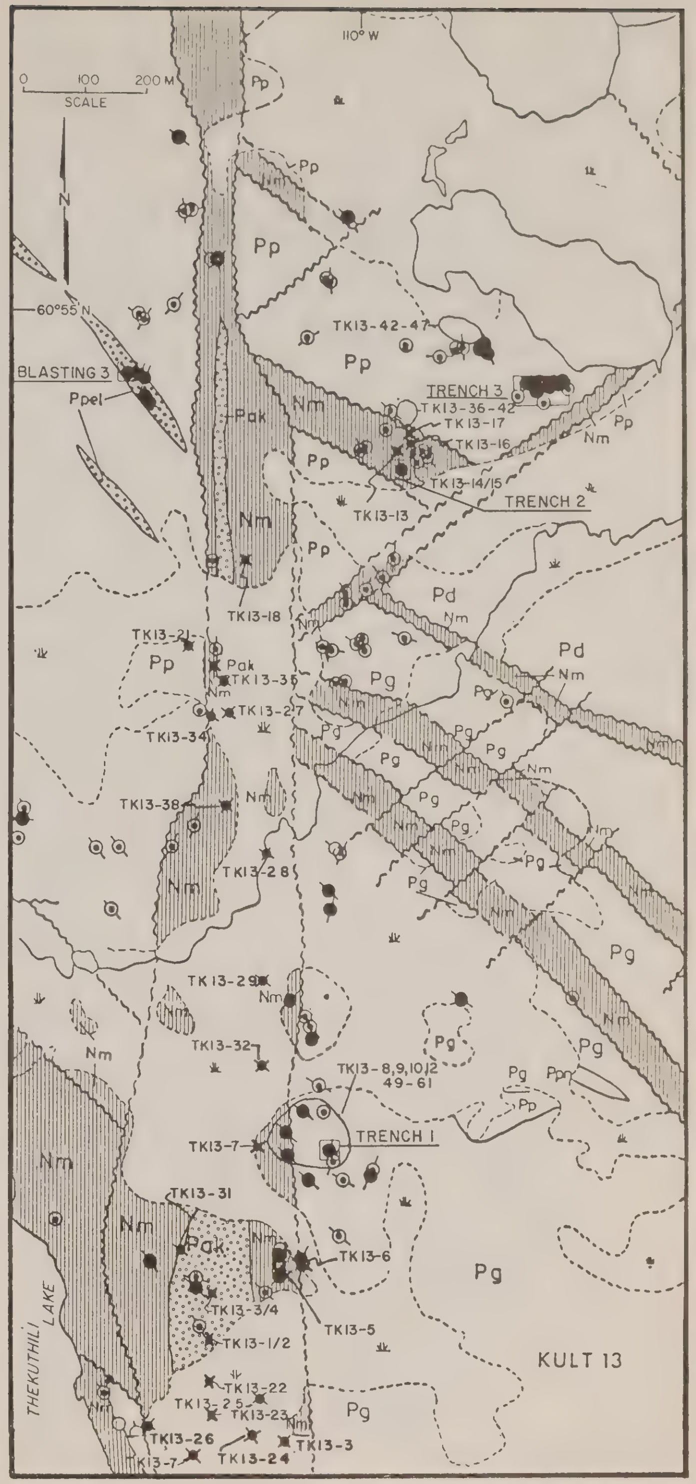
Paragneiss underlies most of the western and northeastern parts of the claim area. Fine-grained pelitic gneiss forms concordant northwest-trending lenses in psammitic gneisses of variable lithology.

Medium-grained sandstone is distributed in lens-shaped zones within the central part of the main north-trending mylonite belt. Rare coarse and fine grained phases are present as well.

Mylonites correspond to faults and usually grade into the surrounding rocks. They trend in three directions; north, northwest and northeast. At the north and south boundaries of the claim, the large north-trending mylonite zone is 250 and 500 metres wide respectively (Fig. 6-11). Original lithologies are sometimes preserved in the mylonite zones.

More than 40 radioactive anomalies on KULT 13 are concentrated in mylonite zones and the granitic rocks (in the south), in granitic rock surrounded by mylonites (in the central-east), or in paragneiss (in the northeast). The anomalies trend northeast, northwest and north. They are considered to be related to fault systems trending in the same directions.

Uranium minerals are generally found along fractures and are associated with chlorite, carbonates, hematite, quartz, sericite and base metal sulphides such as pyrite, galena, chalcopyrite and sphalerite. This situation is common in hydrothermal uranium deposits.



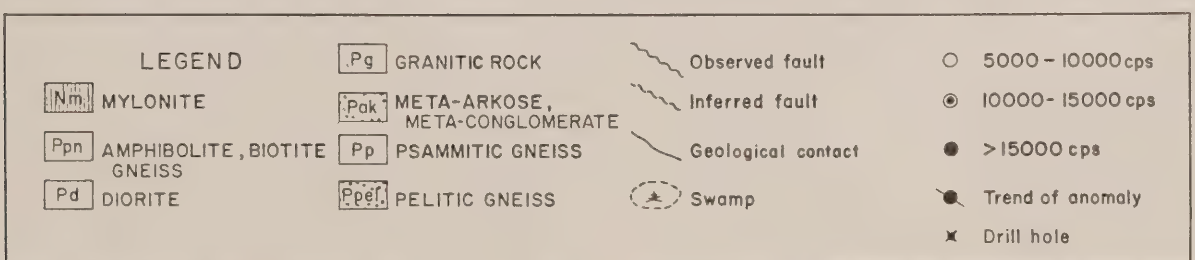


FIGURE 6-11: Geology and drill hole localities, KULT-13 claim.

Eight of the main mineralized areas were surveyed, trenched and blasted in 1980-1981 and twenty holes (2,942 m) were drilled and probed in 1981.

In the spring of 1982, nine holes (1,821.5 m) were drilled on KULT 13 (6 holes, TK 13-24 to TK 13-29, Fig. 6-11) and adjacent northernmost KULT 17 (3 holes, TK 17-1 to TK 17-3). The target of all holes, except TK 13-26, was the meta-arkose unit (Pak) within the north-trending mylonite zone in central KULT 13 and 17, (see Fig. 6-11).

The arkosic sandstone found in the mylonite zone is massive and mainly medium to coarse grained. It contains poorly sorted quartz and red clast granules. Pebble-bearing layers are often encountered. The unit is in fault contact with the surrounding mylonite. It appears to pinch out south of hole TK 13-23 and not extend into KULT 17, as was previously thought. Up to 240 ppm uranium was encountered in arkose in holes TK 13-27 and TK 13-28, but not in adjacent holes. Up to 950 ppm uranium was also detected in the mylonite that forms the footwall of the arkose in TK 13-27. There are a large number of radiometric anomalies in the footwall mylonite which are partly associated with base metal sulphides such as galena, sphalerite, chalcopyrite and pyrite, (DIAND assessment report 081564).

During the 1982 and 1983 field seasons, exploration in the KULT 13 area consisted of detailed grid mapping, trenching (about 6 cubic meters), geophysics (magnetometer - 1982, VLF EM - 1983) and drilling (21 holes - 2,358.7 m in 1982 and 11 holes - 1,145.2 m in 1983). In 1982, trenches were made in the extension of a uraniferous andesite dyke and a radioactive fracture in the dyke, and a radioactive fracture in mylonitized psammitic gneiss on KULT 23 and 24 respectively. The latter proved to be the more interesting with fracture fillings of pyrite and calcite, traces of pitchblende, chalcopyrite, galena and secondary uranium minerals. The magnetometer survey outlined an andesite dyke in KULT 13, but failed to show another andesite dyke in KULT 23. The VLF-EM survey conductors defined a zone of extreme granulation with the mylonite zones, as well as cross-cutting structures. A radon survey indicated anomalies that correspond with and confirm a 1980 Track Etch survey.

Results of the 1982 and 1983 drilling are confidential until 1986-1987 under provisions of the Canada Mining Regulations.

<u>KULT 17, 60-62:</u> $60^{\circ}52'N, 109^{\circ}59'W$
75 C/13

These claims are 5 to 10 km southeast of the southeast corner of Thekulthili Lake (Fig. 6-9). The KULT 60-61 claims were staked in July,1981 and the 1982 exploration consisted of geological and radiometric mapping (KULT 60-61) and soil sampling and Track Etch surveys (KULT 17 and 62).

Only 3 of 33 radiometric anomalies are in mylonite, with the best one registering up to 5,000 cps and assaying up to 0.056% U_3O_8 and 0.011% ThO_2. Most of the remaining anomalies are in local pegmatites and psammitic gneiss.

<u>KULT 63 and 64:</u> $61^{\circ}N, 110^{\circ}07'W$
75 D/16

KULT 63 and 64 are in the Bigpine Narrows area of southern Thekulthili Lake. The claims cover mainly polymictic conglomerate of the Nonacho Group. The 1982 ground and airborne prospecting and radiometric surveys did not produce any significant anomalies.

<u>KULT 65:</u> $61^{\circ}06'N, 110^{\circ}18.5'W$
75 E/1

KULT 65 is centered on Jerome Lake and is underlain by relatively uniform quartzose sediments trending north-northwest and dipping steeply to the east-northeast. The 1982 surveys failed to reveal any anomalous radioactivity in the claim area.

<u>KULT 68 and 69:</u> $61^{\circ}10'N, 110^{\circ}W$
75 F/4

KULT 68 and 69 are near the east shore of Thekulthili Lake. Archean basement rocks are exposed in the eastern half of KULT 68 and Nonacho Group sediments are exposed in the west and on KULT 69. The contact between the basement and Nonacho supracrustal rocks is generally covered by the lake. The basement rocks on KULT 68 are psammitic gneiss, hornblende gneiss, amphibolite and mylonite. Oligomictic conglomerate of the Nonacho Group is in fault contact with basement amphibolite and hornblende gneiss and conformably overlain by quartzose sandstone. Uranium anomalies were found in the three principal basement lithologies, in fractures along and on either side of an andesite dyke-conglomerate contact, and with thorium-rich, red-coloured volcanic clasts in conglomerate. However, the majority of the radiometric anomalies are near the amphibolite-paragneiss contact.

KULT 79: 61°10'N,109°52'W
(1983) 75 F/4

KULT 79 was staked in 1982 to protect an anomalous zone discovered during a heliborne spectrometer survey. About 70 anomalies, clustered in three main zones, were found in psammitic gneiss and hornblende gneiss. Pitchblende and yellow uranium oxides are present with calcite and hematite filling fractures. However, all of the anomalies lack size and continuity.

C) SALKELD LAKE-HJALMAR LAKE

KULT 35: 61°23'N,109°40'W
75 F/5

KULT 35 is about 8 km east of Salkeld Lake. A fault-contact cuts east-west across the center of the claim, separating basement rocks to the south from Nonacho Group sandstone to the north. In 1981, two small thorium-rich radioactive zones were found to be associated with biotite in pegmatitic facies of basement paragneiss. Other anomalies were found in the Nonacho Group, but they are small and discontinuous.

KULT 59, 76-78: 61°23'N,109°39'W
75 F/5

KULT 59 and the adjoining KULT 76-78 claims are between Salkeld and Hjalmar lakes in the northern part of the project area (Fig. 6-9). All but the northernmost strip of KULT 76 are underlain by paragneiss, granite gneiss and other granitic rocks of the basement complex. A cataclastic zone is related to faulting in the west part of KULT 59.

A 1980 airborne survey identified numerous radiometric anomalies in the area of KULT 59. Subsequent ground surveys over some 4.3 km of grid lines outlined three areas of interest with count rates from 19,500 to 28,000 cps. These zones were trenched in 1981.

Numerous radiometric anomalies were identified on KULT 59, mainly in the southwest corner of the claim. They are distributed in several zones within 500 metres of a major north-northwest-trending fault and/or adjacent east-northeast-trending structures, mainly on the east side of the fault. Uranium, present as pitchblende in narrow fractures in paragneiss, prompted the staking of the KULT 76-78 claims and the establishment of a detailed grid in the area as a base to identify lithological, geochemical and structural controls. Work included geological mapping at 1.2,500 scale, a radiometric survey, 15 line-km of total field magnetics and VLF EM (Cutler and Seattle Stations), a 57-sample Track Etch survey and a 56-sample geochemical soil survey. Rock samples were collected and used to prepare 66 petrographic reports or descriptions, and 93 geochemical rock chip assays.

In 1983, the KULT 76-78 claims were prospected and mapped and several new trenches were excavated in the anomalous southwest area of KULT 59.

D) SPARKS LAKE - NASKETHEY LAKE

KULT 40-41: 61°21'N, 109°32'W
75 F/5

The claims are at the west end of Naskethey Lake, where the basement-Nonacho Group contact runs diagonally northeasterly through the area (Fig. 6-9). This contact is in part an unconformity and in part a fault. Basement rocks in the northwest are altered paragneisses, granodiorite gneisses, quartz monzonite gneisses and meta-intrusives. Nonacho Group sediments to the southeast are mainly quartzose sandstone and arkose with minor shale and conglomerate. Radioactivity is associated with several heavy mineral layers in the arkose on an island in the west part of KULT 40.

Reconnaissance mapping and prospecting in 1982 led PNC Exploration (Canada) Ltd. to focus on a small area with several radioactive anomalies in the northwest corner of KULT 41 (Fig. 6-9). Several anomalies lie along a northeast trend which correlates with a mylonite zone that parallels the basement- Nonacho Group contact. Trench 83-41 was stripped and blasted in this zone. Results of the trenching are presently confidential.

KULT 45: 61°16'N,109°28'W
75 F/6

The westernmost third of KULT 45 includes the northwesternmost part of Sparks Lake, including the eastern two thirds of a large island known as Three Kilometre Island to PNC exploration staff.

Basement rocks on the mainland include amphibolite (metavolcanic) and granite, however, on Three Kilometre Island, only granite basement is present along with arkose and argillite of the

Nonacho Group and dyke rocks. These dyke rocks include: a large basic dyke of coarse to fine grained gabbro-diorite, younger granitic dykes containing xenoliths of arkose and a younger basic (diorite) dyke.

Uranium minerals and anomalous radioactivity on KULT 45 are restricted to the 100 by 500-metre area of the basic dyke on the southeast corner of Three Kilometre Island.

Geophysical surveys (magnetic, VLF EM and HLEM) done in 1982 do not show any correlation to uranium minerals. Only total field magnetic data were useful in outlining geologic contacts.

OTHER CHURCHILL PROVINCE

The geology of the Churchill Province in the District of Mackenzie is known principally from the results of reconnaissance mapping. Summaries of the geology of the Churchill Province have been prepared by McGlynn (1970b) and Davidson (1972b). Only recently has more detailed work become available for parts of the region, (Aspler, in preparation; Bostock, 1982; Culshaw, 1984).

Fraser (1978, p. 195) summarized the metamorphism in the area as follows:

> The northwestern Churchill Province is underlain mainly by quartzofeldspathic gneiss and subordinate metavolcanic and metasedimentary rocks of Archean age which have been metamorphosed to amphibolite and granulite facies.Metamorphism to amphibolite facies probably took place during the Kenoran Orogeny. Metamorphism to granulite facies, characterized in the north by biotite-hornblende-hypersthene assemblages and in the southwest by garnet-cordierite-sillimanite-spinel assemblages, is possibly pre-Kenoran. Early to mid-Aphebian, greenschist to lower amphibolite facies metamorphism recognized in Aphebian strata at Great Slave Lake, may elsewhere overprint amphibolite and granulite facies rocks.

SNO 1-5

Golden Rule Resources Ltd.	Gold
150, 1300 - 8th Ave. S.W.	65 D/2,3,7,16
Calgary, Alta., T2R 1B2	

REFERENCES

Eade (1981a); Gibbins (1984); Laporte (1974b); Ridler and Shilts (1974); Schiller (1965); Taylor (1963).

DIAND assessment reports 081715 and 081717.

PROPERTY

SNO 1-2; SNO 3-4; SNO 5.

LOCATION

The claims are all in the Snowbird Lake area in the southeast corner of the District of Mackenzie almost midway between Yellowknife (650 km to the west-northwest) and Churchill, Manitoba (550 km to the east-southeast). The SNO 1 and 2 claims (60°54'N, 102°27'W) are 12 km east of the north end of Snowbird Lake (Fig. 6-1). SNO 3 and 4 (60°03'N, 103°18'W) are 15 km south of the southwest corner at Atzinging Lake and 5-7 km north of the southern boundary of the Northwest Territories and SNO 5 is 5 to 6 km east of the geographic center of Bourassa Lake. The area lies at the southwest end of the Ennadai Lake-Rankin Inlet Volcanic Belt (Ridler and Shilts, 1974).

HISTORY

The SNO 1-2 claims include a high-grade gold showing formerly staked and explored as the COP claims in 1969 and 1964. Schiller (1965, p. 14-16) reports the best assay was 169.3 g/t of gold and 132.3 g/t silver over a width of 0.5 m. Mineral rights to the area (65 D/16) were held by Gulf Minerals Canada Ltd. under Prospecting Permit 448 during 1977-1979 as part of their Ennadai Lake project (Laporte, 1981, p. 35-36), but little or no detailed prospecting or mapping was done on the permit area.

SNO 3 and 4 include a showing, referred to as the 'N occurrence', discovered by Canadian Homestead Oils Ltd. in 1971 and 1972 in Prospecting Permit 138 (Laporte, 1974b, p. 3-4). Canadian Homestead Oils Ltd. had airborne EM, magnetic and radiometric surveys flown and contracted ground follow-up that led to the discovery of the N occurrence. The property was then optioned to Imperial Oil Ltd., who enlarged the grid and did geophysical and soil geochemical surveys. The soil geochemistry results were not encouraging and none of the conductors were drill-tested.

There is no record of previous work at the SNO 5 claim, but it is partly in 65 D/7 granted to Canadian Homestead Oil Ltd. in 1971-1972 as Prospecting Permit 140.

The SNO 1-5 claims were staked in the fall of 1981.

In 1981 a regional lake-sediment sampling program obtained 245 samples that were analyzed for copper, lead, zinc, nickel, silver, gold and arsenic. The

density was not great enough to properly define their geographical distribution and geological significance. At the same time, previously discovered mineral showings were revisited and sampled. On the SNO 1 and 2 claims, gold was found to be associated with late structures and quartz veining. The N occurrence on the SNO 3 and 4 was visited and sampled. The SNO 5 claim contains iron formation that was sampled for gold (Gibbins, 1984).

DESCRIPTION

All of the SNO claims contain Archean sediments and volcanics of the Ennadai Lake-Rankin Inlet Belt (Ridler and Shilts, 1974 ; Eade, 1981a). Taylor (1963) described the volcanics as mostly basalt flows, but including tuffs, laminated metavolcanics and hornblende-feldspar gneiss and interbedded greywacke. Most of the basalt is massive, but some flows display poorly developed pillows; others show scoriaceous tops and flow top breccias. The sedimentary rocks consist of greywacke and quartzite. Most of the greywacke shows a well-developed fine lamination, but massive units are found as well. The quartzites are not as extensive and usually contain cross-bedding or graded bedding.

CURRENT WORK AND RESULTS

In 1983 detailed work on the SNO 1 and 2 claims resulted in the discovery of a fourth mineral showing called Cop #4, in the north-central part of SNO 1. It is similar to other showings and is related to a shear-vein system with varying amounts of quartz and various sulphide minerals. A grab sample of shear and vein material (R-8-19-5) assayed 32.4 ppm gold and a sample of galena-rich rock (R-8-19-3) contained 11.3% lead and 280 ppm silver. A number of outcrops of sulphide, magnetite and silicate facies iron formation were discovered in the vicinity of the claims, but significant gold assays were not obtained. Geological observations indicate that the regional mapping (Taylor, 1963) is simplified but generally correct.

The N showing on SNO 3 was trenched to expose probable frost-heaved blocks. Sulphides in quartzites and graphitic schists of 'probable tuffaceous origin' consist mainly of disseminated pyrrhotite and/or pyrite. A number of sulphide-bearing boulders were discovered and examined in the vicinity of SNO 3 and 4. Elevated levels of silver and copper and some minor enrichment of gold are evident along the contact between metavolcanic and metasedimentary rocks.

Samples of sulphide-bearing mafic volcanics collected near an arsenic lake-sediment anomaly on the SNO 5 claim have low gold, silver and copper contents.

An air photo interpretation of the claim areas indicated a number of lineaments related to glacial and bedrock trends as well as mineralized contacts and structures.

LEA 1-20

Lloyd Anderson and William Kizan	Copper,Nickel
c/o Snowdrift Enterprises Ltd.	75 E/10
Snowdrift, NWT	61°37'N,110°47'W

REFERENCES

Culshaw (1984a, b); Henderson (1939).
DIAND assessment report 081712.

PROPERTY

LEA 1-20

LOCATION

The claims are centered on and include most of Rutledge Lake and adjacent shorelines. Rutledge Lake is about 200 km southeast of Yellowknife and 180 km north-northeast of Fort Smith (Fig. 6-1).

HISTORY

Mr. W.W. Kizan and Mr. Lloyd Anderson first prospected at Rutledge Lake in 1980 after having sighted gossans from the air during flights across the lake. In late 1980 Mr. Kizan brought rock and mineral specimens to Trigg Woollett Consulting Ltd.'s office, where they were determined to be of volcanic origin, and because the mineral specimens contained layered sulphides, it was surmised that the deposits from which they were derived may have been formed under volcanic conditions.

In September,1981 Trigg Woollett Consulting Ltd. geologists spent several days in the Rutledge Lake area trying to define the margins of the volcanic belt. This mapping defined a belt of metatuff of intermediate composition which was determined to be at least 59 km long and which tapered rapidly at the north and south ends. The maximum width of the intermediate tuff belt is 17.5 km. More than 70 gossans and 41 sulphide mineral showings were identified during the reconnaissance mapping; about 75% of these are within the belt of intermediate metatuff. Only three of the sulphide showings were examined in detail. The LEA 1-20 claims were staked in the fall of 1981.

1. *Rutledge Lake complex, interlayered granite gneiss and paragneiss; 1a, dominant paragneiss; 1b, dominant granite gneiss.*
2. *Mama Moose complex, paragneiss and metabasite.*
3. *Charnockitic gneiss.*
4. *S-type granite, weakly foliated.*
5. *Eastern granite, gneissic megacrystic granite and pink leucogranite with metabasite enclaves.*
6. *Mylonites of granitoid protolith.*
7. *Small mafic and ultramafic bodies.*
8. *Cu mineralization (associated with unit 7).*
9. *Hypersthene-out, hornblende-in isograd; teeth on high grade side.*

FIGURE 6-12: Geology of the Rutledge Lake area (from Culshaw, 1984a). The boundary between units 1 and 4 is gradational. The boundaries of unit 6 were derived by air photo interpretation

DESCRIPTION

R.A. Olson and D.J. Pawliuk of Trigg Woolett Consulting Ltd. describe the geology of the area as follows:

> Rutledge Lake area is predominantly underlain by metamorphosed equivalents of volcanic tuffs of felsic to intermediate composition. In general, quartz-rich felsic metatuffs underlie a series of northerly trending ridges, whereas intermediate-to basic-metatuffs or other volcanic rocks underlie lake- and muskeg-covered areas. The felsic to intermediate volcanic rocks are locally interbanded at contacts between the units. Granitic and gneissic rocks are present at a few locales near Rutledge Lake.

Culshaw (1984a, b and Fig. 6-12) recently mapped the area at a scale of 1:30,000, but only reconnaissance mapping by Henderson (1939a) published at 1:250,000 was available at the time of discovery and the Trigg Woollett Consulting Ltd. work. The Henderson map shows the area to be underlain by granitic rock, however, aeromagnetic maps (GSC map 1566A, 1637G and 1638G) indicate more complex geology.

Culshaw (1984a, b) mapped and defined the Rutledge Lake complex as follows:

> It is composed of four types of granitoid gneiss, three types of supracrustal gneiss and associated minor metabasite bodies, all steeply dipping and interlayered on all scales. This gneiss belt is situated on the boundary between north-south trending positive and negative magnetic anomalies.

To the south this boundary is coincident with a belt of highly deformed gneisses, which includes mylonites. At their northern end the anomalies curve northeastward into the wide positive magnetic anomaly marking the Slave-Chantrey Mylonite Zone.

The paragneiss component of the Rutledge Lake complex has a range of compositions characterized by three end members: a migmatitic pelitic gneiss containing garnet, sillimanite, cordierite and spinel; a quartzite with minor pelitic horizons; and a quartz-feldspar metawacke. These gneiss types are interlayered on a centimetre to a decametre scale. The granite component of the complex is predominantly a pale buff, pink or white weathering leucocratic gneiss of granite to granodiorite composition.

The Mama Moose complex (unit 2, of Culshaw, 1984a, Fig. 6-12) is outlined on the aeromagnetic maps by prominent positive anomalies. It has paragneiss and metabasic components. The metabasite forms thick (50-200 m), steeply dipping continuous layers within the predominant paragneiss. Unlike the paragneiss of the Rutledge Lake complex, these rocks are not generally intimately interlayered with granite.

The terrain to the west of the lake is underlain by a medium grained, weakly foliated, pale pink granite (unit 4, Fig. 6-12), probably a less deformed equivalent of the granite component of the Rutledge Lake complex. Megacrystic granite has only been recognized during reconnaissance in the extreme west. Within this less deformed granite terrane are two narrow metasedimentary belts trending northeast and southwest, at a high angle to the Rutledge Lake belt. These belts, not shown in Figure 6-12, are located some 5 km from the lake, in the north-west and southwest, respectively, of the area.

The eastern granite (unit 5, Fig. 6-12) is composed of a grey, strongly deformed and recrystallized megacrystic granodiorite and a pink leucogranite. The pink granite is in many places charged with amphibolite inclusions. These rocks become more frequently cut by epidote-filled fractures closer to the belt of mylonite (unit 6, Fig. 6-12).

The (proto-) mylonites of the mylonite belt are predominantly derived from a granitic protolith. They are pink weathering, but dark and aphanitic on fresh surfaces. Many are charged with numerous feldspar porphyroclasts. Cataclasite is developed along a lineament that lies within the mylonites and is interpreted as a late fault.

Small ultramafic and mafic bodies (units 7 and 8, Fig. 6-12) are a volumetrically minor but very significant component of the gneiss belt, where they are closely associated with copper-nickel minerals. Many are only a few decimetres wide and one or two metres long, although a few of the larger bodies occupy entire outcrops. Rare pyroxene porphyroclasts and a strong tectonic fabric suggest they originated as somewhat longer bodies which were subsequently boudinaged (Culshaw, 1984a, p. 334).

Most commonly the ultramafic rocks are fine, dark green, granular and somewhat micaceous. Both ortho- and clinopyroxene display kinking and undulatory extinction and are variably altered to secondary amphibole. An assemblage of spinel-olivine-ortho-pyroxene-amphibole is preserved in the least altered ultramafic body, near the northernmost showing. Mafic bodies are less abundant than ultramafic bodies. They include two-pyroxene, mafic granulites of gabbroic composition. Locally they are interlayered with the ultramafic types.

Numerous narrow diabase dykes trending 140 to 160^{o} transect the lake. They outcrop most frequently in the centre and at the northern end of the lake, clustering around two large dykes (ca. 20 m wide) which cross the lake at these locales. These appear to be entirely fresh and to postdate all except the latest faulting, and are correlated with the Sparrow Dykes (Culshaw, 1984a).

CURRENT WORK AND RESULTS

1982:

During 1982 Messrs. Kizan and Anderson continued to prospect the claims and several geologists from various mining companies and John Brophy, DIAND Staff Geologist from Yellowknife, visited and sampled the various mineral showings (Fig. 6-12). Most of these samples were grab samples that returned low but interesting assays for copper, nickel, cobalt, molybdenum, lead, gold and silver.

Trigg Woollett Consulting Ltd. recommended a four-phase exploration program consisting of airborne electromagnetic and magnetic surveys, ground geo-physical follow-up of selected anomalies and detailed prospecting, mapping, trenching and drilling. Vancouver Petrographics Ltd. was commissioned to do

a petrographic study of rock samples from the area. They concluded that the rocks were rhyolite metatuff and intermediate metatuff.

1983:

Airborne Geophysics

Questor Surveys Ltd. flew 2,211.5 km of Standard Mark IV INPUT-EM and magnetic survey over the Rutledge Lake area in July and August, 1983. Line spacing was 350 m and lines were flown in east and west directions. The linearity of conductive and magnetic trends and anomalies in the Rutledge Lake area is normally interpreted as an indication of a sedimentary environment. However, the large number of short strike-length conductors, detected as a result of the 1983 survey, may fit a wide range of target models including volcanic belts, fault or shear zones and graphitic units. All of the anomalies deemed significant have transient decay rates that are typically associated with a wide range of sulphide deposits. Twelve class 1, nineteen class 2 and five class 3 conductive-magnetic zones were outlined with four (43 C, 62 G, 86 B and 146 C) recommended for immediate attention. Two examples of conductive lake bottom sediments were identified, they are very distinctive and not common in the area.

Ground Follow-up

Trigg Woollett Consulting Ltd. conducted prospecting, grid line-cutting, geological mapping, VLF-EM and magnetic surveys, soil and rock chip sampling between September 28 and October 11, 1983, on five priority INPUT-EM/magnetic targets. This work showed that the airborne survey had effectively outlined sulphide mineral occurrences of similar size, mineralogy, geological setting and geophysical properties. Ground VLF-EM and magnetometer surveys were much more effective in outlining sulphides than soil geochemistry. Economic sulphide showings were not discovered.

Staking

The ENEX 1-10 mineral claims (10,096.33 ha) were recorded October 5, 1983 in the name of Enexco International Ltd. to protect INPUT conductors outside the LEA 1-20 claims.

Reinterpretation of Geophysical Programs

Paterson, Grant and Watson Ltd. was contracted to synthesize and reinterpret the 1983 geophysical work. The raw aeromagnetic data was modified to produce apparent magnetic susceptibility maps. This technique calculates the magnetic susceptibility distribution in the ground that would be required to produce a total magnetic field contour map identical to the one measured. This map not only effectively removes most of the regional gradient, but also provides a measure of the local susceptibility, which is related to the magnetic minerals of the rocks. The magnetic susceptibility map forms the basis of a new geological interpretation which has similar regional but markedly different detail than the Trigg Woollett mapping. The Paterson, Grant and Watson interpretation recognized three principal magnetic terrains, consisting of low, intermediate and high magnetic relief.

They also recognized 81 single or multiple INPUT conductors and observed that the magnetic susceptibility anomalies are confined both along strike and laterally, to the regions of highest conductivity.

Five priority ratings (A, A-, B, B- and C) were assigned to the 81 INPUT conductors to be considered along with other factors such as size, shape, geological environment and accessibility to select conductors for further work. They suggested that ground EM using horizontal loop (i.e., Max-Min) is preferable to VLF-EM, because widespread pyrrhotite will make it important to find the main axis of the airborne conductor.

Insufficient conductive material was noted during ground follow-up to account for strong INPUT anomalies, and more ground geophysical work and drilling appear to be warranted.

JT CLAIMS

Talston River Mining Ltd.	Lead, Zinc
Box 618	$67^{\circ}17'$N,$112^{\circ}35'$W
Pine Point, NWT	85 H/7

REFERENCES

Brown (1950).

National Mineral Inventory Report 506189.

PROPERTY

JT 1-6	85 H/7

LOCATION

The prospect is located about 13 km south-southeast of Rocher River. The area is immediately east of the mid-point of Snuff Channel, near its

tributary with Little Hay Creek. Regionally, the JT claims are near the western margin of the Churchill Province of the Precambrian Shield about 15 km south of Great Slave Lake (Fig. 6-1).

HISTORY

The first recorded claim on the showings was the HOPE claim staked in 1920. In 1930 the BULL MOOSE, and adjoining HOPE claims were staked along with some 80 others in the area by George and Letha Kaine. In 1962, the JIM group of 33 claims was staked and recorded by F. Avery and C. La Chance of Yellowknife, and some trenching and sampling done.

In 1966 the ground apparently came open and was restaked as the RT group and acquired by Carolin Mines Ltd. A limited amount of geological work was done on showings that had been trenched several years previously.

The JT claims were recorded in the spring of 1983.

DESCRIPTION

Seven lead-zinc showings have been reported on the property. They occur as tension fracture fillings in an Archean porphyritic granite. One of the better showings (No. 6) consists of a vein 30 to nearly 100 cm wide striking southeasterly and dipping about 75^{0} northeast. The vein has been trenched for 30 m, and has been traced for an additional 15 m. It consists of white quartz and calcite, with galena occurring as fragments, crystals and veinlets up to 2.5 cm across. A 30 cm band of breccia along the footwall contains most of the lead and zinc minerals. A channel sample across a 60 cm width of one of the better mineralized sections assayed 0.34 ppm (0.01 oz/ton) gold; 3.43 ppm (0.10 oz/ton) silver; 0.30% copper; 0.63% lead; 2.98% zinc.

No. 3 showing, a vein about 30 m long, and up to 30 to 45 cm wide is well mineralized with galena and sphalerite (Brown, 1950 and National Mineral Inventory, No. 506189).

CURRENT WORK AND RESULTS

In 1983 a group of prospectors from Pine Point re-examined quartz-galena-sphalerite-fluorite veins and blasted out fresh samples. Silver assays were lower than they had anticipated.

EAST ARM OF GREAT SLAVE LAKE
(ATHAPUSCOW AULACOGEN)

Hoffman (1974, 1977 and 1981) named the East Arm area the 'Athapuscow Aulacogen', a "deformed east-northeast-trending basin, 270 km long by, at most, 80 km wide. It contains little-metamorphosed early Proterozoic sedimentary and magmatic rocks exposed in and around the East Arm of Great Slave Lake".

The East Arm had little exploration for minerals in 1982 or 1983. Several prospectors and geologists made brief reconnaissance visits to the area. Asarco Exploration Canada Ltd. had a reconnaissance project in the Talthili Narrows area and Cominco Ltd. had one on Union Island.

BLATCHFORD LAKE PLUTONIC COMPLEX

INTRODUCTION

The Blatchford Lake intrusive suite includes all the plutonic rocks of alkaline affinity that form a coherent complex known as the Blatchford Lake Plutonic Complex. It lies at the southern margin of the Slave Province and is bounded by Blatchford Lake on the north and Hearne Channel of Great Slave Lake on the south (Davidson, 1978). Geological mapping by Davidson (1972, 1978) led to the recognition of several units that make up a multiphase, sub-circular ring complex some 23 km in diameter or 235 km^2 in area, that intrudes Archean plutonic rocks and metasediments of the Yellowknife Supergroup (Fig. 6-13).

The suite shows a remarkable range in composition that developed as the rocks crystallized during a sequence of intrusive events documented by field relationships (Davidson, 1972, 1978). Successive units range from gabbro (with anorthosite inclusions) through leuco-ferrodiorite, quartz syenite and granite to peralkaline granite and syenite (Davidson, 1982).

It is convenient to consider the Blatchford Lake complex in two parts: the earlier, western part including the Caribou Lake Gabbro, Whiteman Lake Quartz Syenite, Hearne Channel Granite and Mad Lake Granite, and the later, more extensive Grace Lake Granite with its Thor Lake Syenite core (Fig. 6-13).

It is within the later peralkaline units that rare element minerals are found (Davidson, 1982).

Isotopic determinations indicate an early Aphebian age (2,150 Ma) for the complex (Davidson, 1982).

THOR PROJECT

Highwood Resources Ltd. Be,Ta,Nb,REE,Y,CaF_2,U,Th,Zr
#400, 805-8th Ave. S.W. 85 I/1,2
Calgary, Alta., T2P 1H7 $62^{0}07'N, 112^{0}35'W$

REFERENCES

Davidson (1972, 1978, 1982); Gibbins (1981, 1983a, b, 1984); Grasty and Richardson (1972); Trueman (1984); Trueman and others (1984).

DIAND assessment reports 081258, 081343.

PROPERTY

THOR 1-45; NB 1-172; DISA 1-5 and REQ 1-3.

LOCATION

The claims are centered on a small lake 105 km southeast of Yellowknife known informally as Thor Lake, which is halfway between Blatchford Lake, 5 km to the north, and Hearne Channel of Great Slave Lake, 5 km to the south.

HISTORY

The area was staked as ODIN 1-4 in 1970 and uranium, thorium and rare earth elements were noted, but little work was done and the claims lapsed.

A government airborne radiometric survey flown in 1971 outlined a significant uranium and thorium anomaly (Grasty and Richardson, 1972). Dr. A.

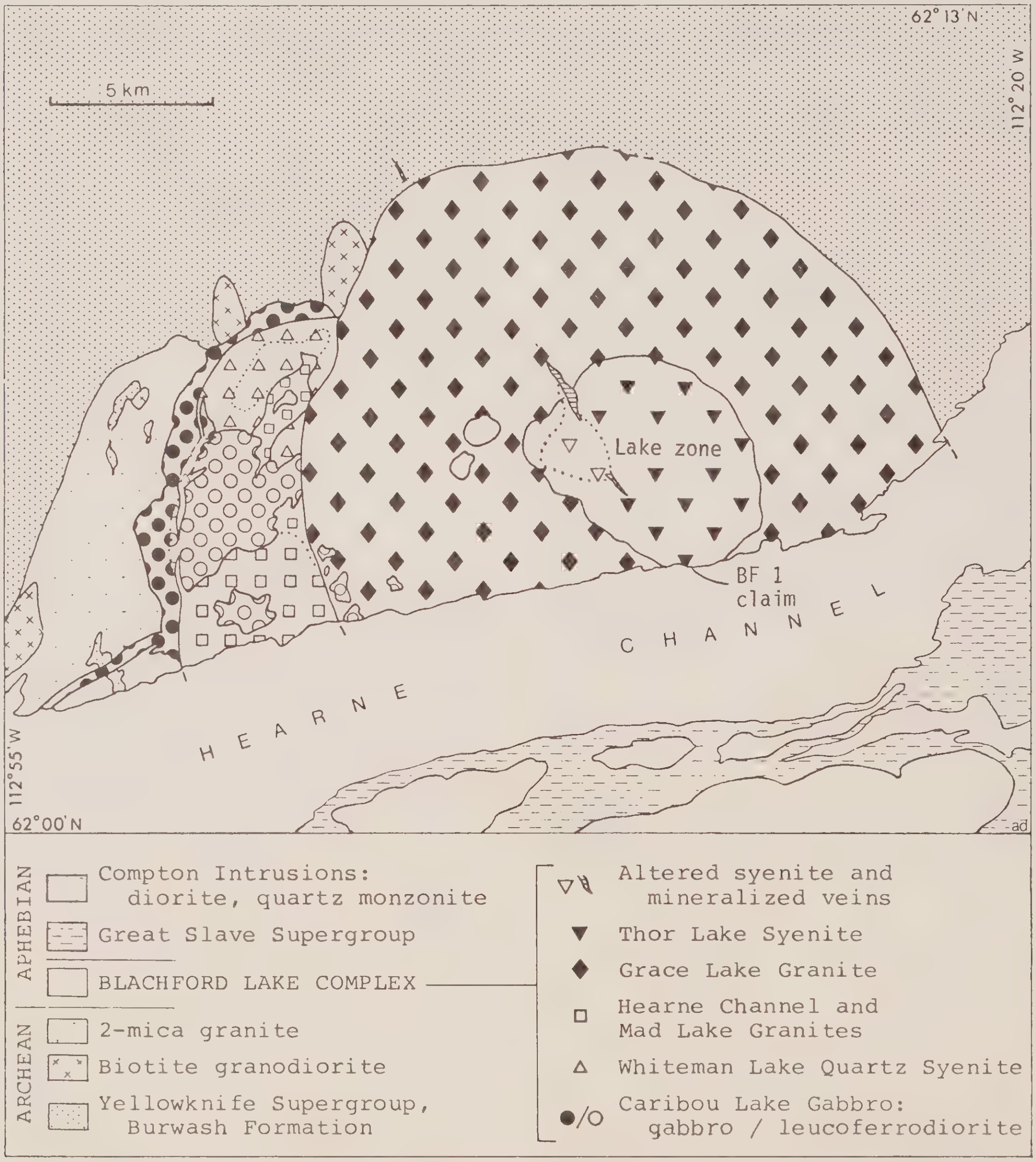


FIGURE 6-13: Geology Blatchford Lake Complex (from Davidson, 1978)

Davidson of the Geological Survey of Canada mapped and defined the Blatchford Lake Complex and its central core of Thor Lake Syenite in 1971 and 1977 (Davidson, 1972, 1978).

During the fall of 1976, geologists of Highwood Resources Ltd. discovered a number of previously undiscovered mineral showings north of the original ODIN claims and staked the THOR 1-4 claims. Additional claims were added later when spectrographic analyses indicated quantities of niobium, yttrium and rare earth elements.

In 1977, Highwood did extensive prospecting, mapping, sampling and radiometric surveys including trenching in the T Zone and 335 m of diamond drilling in the S Zone (Gibbins, 1981). In 1978, 1091 m of drilling was done on the Lake and T Zones (Gibbins, 1983a).

In 1979, work was concentrated on the Lake Zone, where 5 trenches and 5 drill holes (136 m) were completed and sampled (Gibbins, 1983b, p. 174). Wayne Johnson of Target Exploration Services Ltd. mapped the southeast portion of the claims and did a soil radon survey over the Lake Zone in 1979. In September, a crew from the Saskatchewan Department of Mineral Resources did a lake-bottom radiometric, resistivity and bathymetric survey that defined a number of radiometric anomalies beneath the shallower parts of Thor Lake (Gibbins, 1983b).

In the spring of 1980, the claims were optioned to Placer Development Ltd., who drilled 18 holes (2000 m) mainly in the Lake Zone in 1980 and 1981 (Gibbins, 1984, Table 5-9 and Fig. 5-27, p. 277). The core was logged, sampled, and measured for magnetic susceptibility and radioactivity. This work indicates three sub-horizontal mineralized layers 10 to 45 m thick within 100 m of the surface in the Lake Zone, containing 63 million tonnes of indicated and inferred material grading 0.03% Tantalum and 0.4% niobium (columbium) with significant amounts of rare earth elements (samarium 0.1%, cerium 1%, lanthanum 0.6%) and zirconium 3.5% (Highwood Resources Ltd., Annual Report 1981). The T Zone contains 1.15 million tonnes of 0.55% Nb_2O_5 inferred with a further 5.5 to 7 million tonnes probable. Some 67,000 tonnes of 1.5% Nb_2O_5 and 0.05% U_3O_8 are drill - inferred in the S Zone, and an equal amount of similar grade is possible (Highwood Resources Ltd., Annual Report, 1980).

Other work done in 1980 included line-cutting, VLF-EM and radiometric surveys. New trenches were blasted south of the T and S Zones and all previous trenches were cleaned and resampled. Laboratory testing included petrographic, scanning electron microscope (SEM), lithogeochemical and bench tests to study the alteration, ore mineral composition and paragenesis to learn more about the geology and metallurgy of the deposit.

Placer Development Ltd. relinquished the option in the spring of 1982.

DESCRIPTION

The claims cover the central core of the Blatchford Lake Plutonic Complex known as the Thor Lake Syenite. Davidson (1978) mapped five distinct sub-units of the Thor Lake Syenite. A sixth unit of altered and poorly exposed syenite outcrops around and south of Thor Lake (the Lake Zone, Figs. 6-13, 6-14). It is altered by replacement of hornblende with fine aggregates of hematite, albite, fluorite and pale biotite. Davidson (1978) interpreted this as intense alteration of pre-existing syenites, possibly developed under the influence of a late-stage magnetic vapour phase related to, though probably slightly later than, the emplacement of pegmatites and acmite-albite veins to the east.

A zone of black rocks containing veins and irregular masses of pink to buff-coloured fluorite-albite, known as the T Zone, extends north-northwest of Thor Lake for 1250 m. It cuts through the outer syenite contact into the Grace Lake Granite. The F or Fluorite Zone may be an extension of this zone. Similar rocks are associated with narrow systems of syenite pegmatite and acmite-albite veins extending east-northeast from the southern exposed part of the T Zone, referred to as the R and S Zones. All of these zones contain Nb, Ta and REE mineralization, along with high concentrations of Na, Zr, F, Be and locally Y, Th and U (Davidson, 1982).

The Lake Zone, where Placer Development Ltd. concentrated their work, is a 2 km^2 triangular-shaped area of dark, altered and brecciated rock beneath and south of Thor Lake (Fig. 6-14). According to Placer Development Ltd. geologists, brecciation is the dominant feature of the core. Syenite and pegmatitic syenite have mortar texture, some specimens display a streaming of crystal and rock fragments and locally there are rebrecciated breccias. 'Extensive biotite flooding appears as a "sea" of fine-grained, felty, matted biotite with crystal and rock fragment "islands". Zircon flooding

is local and is marked by 30 to 50 percent zircon as crystal aggregates.' (DIAND assessment report 081343).

Petrographic work shows that the tantalum and columbium are present as tanto-columbite in altered syenite. Bastnaesite, (a cerium-lanthanum fluoro-carbonate), allanite, perthitic feldspar, albite, fluorite, carbonate, green muscovite, biotite, and pseudomorphs after mafics and opaque minerals are also present. Tanto-columbite occurs as discrete grains intergrown with magnetite or interstitial with zircon in matrix and biotite-flooded areas. The overall average grain size of elongate tanto-columbite is 20 by 2 microns with a range of less than 10 to 150 microns long by 1 to 10 microns wide. Crystal aggregates are commonly 50 microns across,

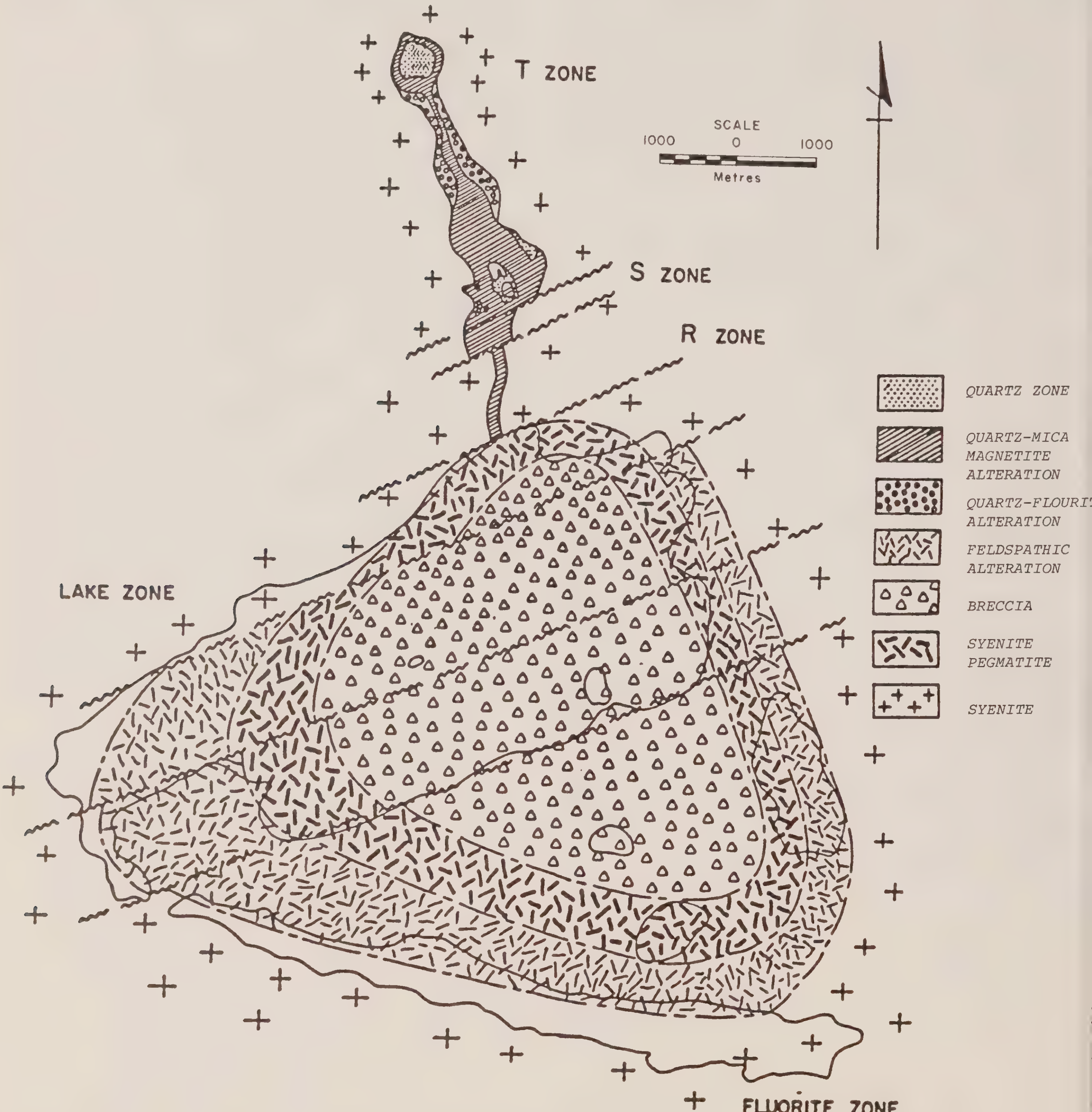


FIGURE 6-14: Distribution of rock types in the Thor Lake syenite altered core (from Highwood Resources Ltd.)

with a maximum range of 100 to 150 microns across.

Patterns of element depletion and enrichment throughout the differentiated suite are consistent with the hypothesis that the observed alteration and mineralization are the end-products of magmatic differentiation (Davidson, 1982).

CURRENT WORK AND RESULTS

1982:

A small bulk sample (4,500 kg) was collected from the Lake Zone and sent to Lakefield Research of Canada Ltd. for metallurgical tests. Magnetometer and scintillometer surveys were done along the southern limits of the property.

1983: T Zone

Following the recognition of important beryllium potential in the T Zone, exploration work was directed mainly towards defining grades and tonnages of this element. Work included re-logging previous drill core from the T Zone, detailed geological mapping (Fig. 6-14), an orientation lithogeochemical survey to identify pathfinder elements, berylometer surveys of core and outcrops, stripping and trenching for bulk samples and a major drilling program from October, 1983 to March, 1984. The drilling outlined some 415,000 tonnes of 1.0% BeO in the North T Zone and 1,180,000 tonnes of 0.66% BeO in the South T Zone for a total of 1,595,000 tonnes of 0.75% BeO to an approximate depth of 61 m (200 feet). A total of 4,174 m was drilled in 72 holes during the winter of 1983-84. Thirty-nine of these holes or 2,009 metres were drilled during 1983. The first two holes in the North T Zone intersected 21.3 m of 2.21% BeO, 3.0 m of 1.40% BeO, 21.6 m of 2.38% BeO, 4.6 m of 0.70% BeO and 12.2 m of 2.33% BeO. A 1,000 lb (456 kg) bulk sample from a pit in this area assayed 0.93% BeO over a length of 18.3 m. A second trench 500 m south assayed 1.61% BeO over a 19.8 m (65 foot) length. A total of 76 m^3 (2,675 cubic feet) was removed by trenching.

Beryllium is also present in the R Zone.

The beryllium at Thor Lake is contained in the mineral phenacite (Be_2SiO_4), a colorless or white glassy mineral that is similar to and often confused with quartz. It normally contains 40-45% BeO by weight. Phenacite (also spelled phenakite), was first reported in altered Thor Lake Syenite by Davidson (1978, p. 126). Preliminary tests indicate that the grain size of the phenacite is amenable to its recovery by an established flotation technique (Trueman, 1984).

Although the beryllium zones are still not fully explored, the Thor Lake deposits appear to be the most significant beryllium deposits in Canada. Meanwhile, additional exploration, metallurgical testing and a pre-feasibility study are underway (1984).

Beryllium is a rare-metal noted for its light weight (lighter than aluminum), high electrical resistivity, high thermal conductivity and heat capacity, high melting point, high strength to weight ratio, and high stiffness. By itself and in alloy form, beryllium finds wide use in electronic and aerospace applications. It is used in computers and peripherals, telephone and telecommunications, fibre-optics, aircraft struts and brakes, satellite frames, radar, and inertial navigation systems. Other applications include use in oil drilling and geophysical equipment, automatic transmissions, x-ray and CAT-

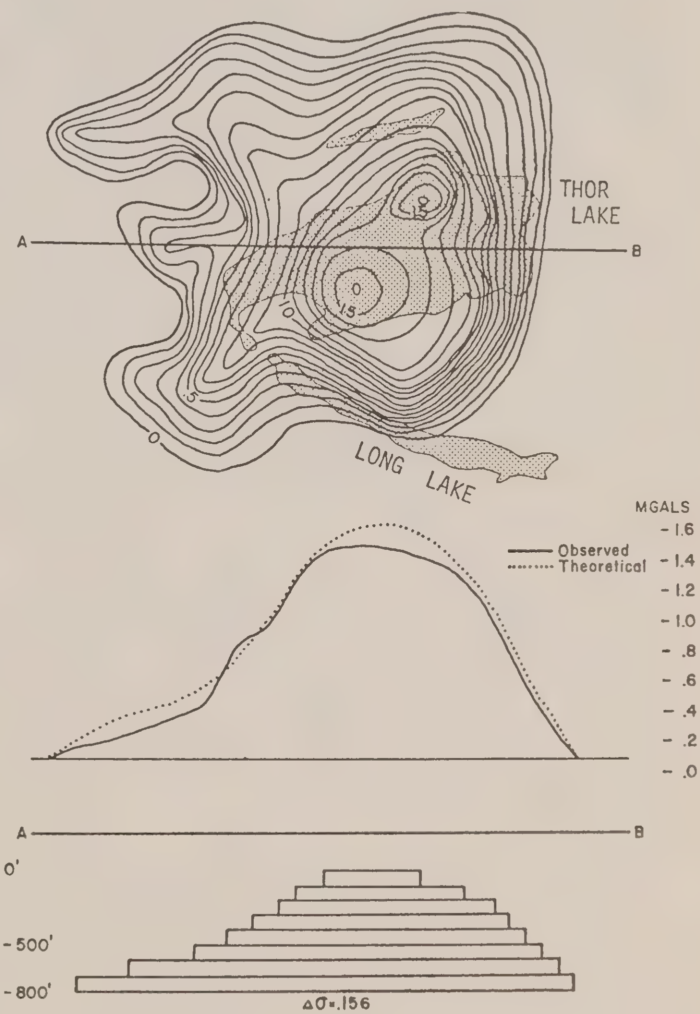


FIGURE 6-15: Residual Bouguer gravity anomaly at Thor Lake (from Highwood Resources Ltd.)

scan equipment, nuclear moderators, and VHSIC computer chips.

Lake Zone

A gravity survey of the Lake Zone was completed in the spring of 1983 to provide insight as to the attitude of the mineralized zones (Fig. 6-15). Modelling of the resulting Bouger gravity anomaly suggests that the tantalum-niobium-rare earth zone extends downward in the form of an inverted cone for several hundreds of feet (Trueman, 1984).

Structural studies of ultra-mylonite observed in core and outcrop, as well as offsets of lithologies, have indicated several fault systems that help explain and confirm the form of the deposits.

Three holes (465 m) drilled in the Lake Zone in the spring of 1984 indicate a greater tonnage than the previously published reserve of 63 million tonnes probably exist at depth.

Metallurgical studies based on oil-phase extraction techniques to recover very fine grained tantalum-niobium minerals continued during 1982 and 1983.

BF CLAIMS

The Big Fish Syndicate	85 I/2
3960 W 33 Ave.	62°04'N,112°30'W
Vancouver, B.C.	

REFERENCES

Davidson (1978, 1982).

DIAND assessment report 081686.

PROPERTY

BF 1 and 2.

LOCATION

The claims are adjacent to the southern boundary of Highwood Resources Ltd.'s NB claims and include a discontinuous thin strip of the north shore of Hearne Channel, 3 - 8 km west of McKinley Point. Over 90 percent of the claim area is under the waters of Hearne Channel.

HISTORY

The BF 1 claim was recorded in September, 1978; BF 2 was recorded in October,1983.

DESCRIPTION

The BF 1 claim includes the southernmost boundary of Thor Lake Syenite and the enclosing Grace Lake Granite (Fig. 6-13). It also contains the intersection of this contact with the north shore of the Hearne Channel and the southeasterly projection of a structural lineament that passes through Highwood Resources Ltd.'s T Zone and Flourite zones (Davidson, 1978, 1982). This southeast-trending lineament is clearly evident on the aeromagnetic maps (Geol. Surv. Can., Map 7190 G). Speculations suggests that this intersection may be the loci for the deposition of tantalum, tin and rare earth minerals similar to those found at Thor Lake or Mountain Pass, California.

CURRENT WORK AND RESULTS

Two trenches were blasted and sampled, one in a quartz-fluorite pegmatite vein and the second in a dolorite dyke. Samples were sent for fire-assay to determine gold and silver and for ICP (inductively coupled Argon Plasma) analysis for another 30 elements.

Magnetometer and scintillometer surveys were undertaken, but significantly elevated readings were not encountered.

THE GREAT SLAVE PLAIN

INTRODUCTION

The Great Slave Plain is that part of the Interior Plains between latitudes 60 and 64°N and between the Franklin Mountains and the western edge of the Precambrian Shield in the vicinity of Great Slave Lake. It is underlain mainly by Paleozoic carbonates, evaporites and shales. It has a relatively flat topographic surface, generally less than 300 m in elevation, that is characterized by sparse outcrop, abundant swamp, sink holes and karst topography. The Horn Plateau, which consists of Mesozoic strata, is a broad, smooth upland,rising to 835 metres in elevation.

The Great Slave Plain includes the Pine Point Lead-Zinc District (Fig. 6-16), the source of a large proportion of the Northwest Territories' annual production of minerals. Because of extensive overburden, the flat-lying attitude of the host rocks and the nature of Pine Point type Pb-Zn deposits, exploration is mainly by IP surveys (Lajoie and Klein, 1979) and fence or grid drilling. Attempts to find deposits using rock and soil geochemistry, gravity and EM surveys have not been cost effective. Most exploration work is done in the winter months when the widespread swamps and muskegs are frozen.

Activities in the Pine Point Lead-Zinc District were severely affected by the 1982 economic recession and accompanying low metal prices. Pine Point Mines

Ltd., the only producer in the region (see Chapter 2), shut down operations from January 2 to June 15, 1983. Mine production came from five operating and two developing pits in 1983 compared with eleven pits in 1982. About 900,000 tonnes of ore was milled in the six and a half month operating period in 1983, compared to about 2,200,000 tonnes for all of 1982.

Tabular ore zones were mined for the first time in 1981 and most of the 1982-83 production came from deposits of the North Trend (Alldrick and others, 1981; Rhodes and others, 1984).

Exploration statistics are given in Table 6-6 for the years 1982 and 1983. However, most of this work is on mineral leases and the results are rarely reported as assessment work or to the public. When assessment work is required, it is not submitted in the form of comprehensive geological reports. Much of the 1979-1983 drilling was along the North Trend, near the northern boundary of the Pine Point claims, where considerable reserves have been outlined. In 1982, 1875 m of drilling (10 holes) on the JMBS claims and 350 m (3 holes) on the AJME claims (Fig. 6-16) was submitted for assessment purposes.

Late in 1981 a large prismatic-type ore body (N-81) containing 0.9 million tonnes of high grade Pb-Zn, was discovered about 20 km west-southwest of the concentrator (Fig. 6-16). The 1982 exploration program confirmed the existence of 1.8 million additional tonnes of ore. The N-81 deposit contains a total of 2.7 million tonnes of ore grading 7% lead and 14% zinc and is expected to become the most important production area over the next five years (Carter, 1984).

The 1983 exploration program was successful in discovering 700,000 tonnes of ore grading 1.1% lead and 4.2% zinc in two production areas on the property.

TABLE 6-6: SUMMARY OF EXPLORATION ON PINE POINT MINERAL LEASES

	1982	1983
Expenditure (millions of dollars)	3.7	2.4
Geophysics - IP (line-km)	431	96.5
Exploration drilling (m)	43,282	35,052
Ore outline drilling (m)	16,154	69,970

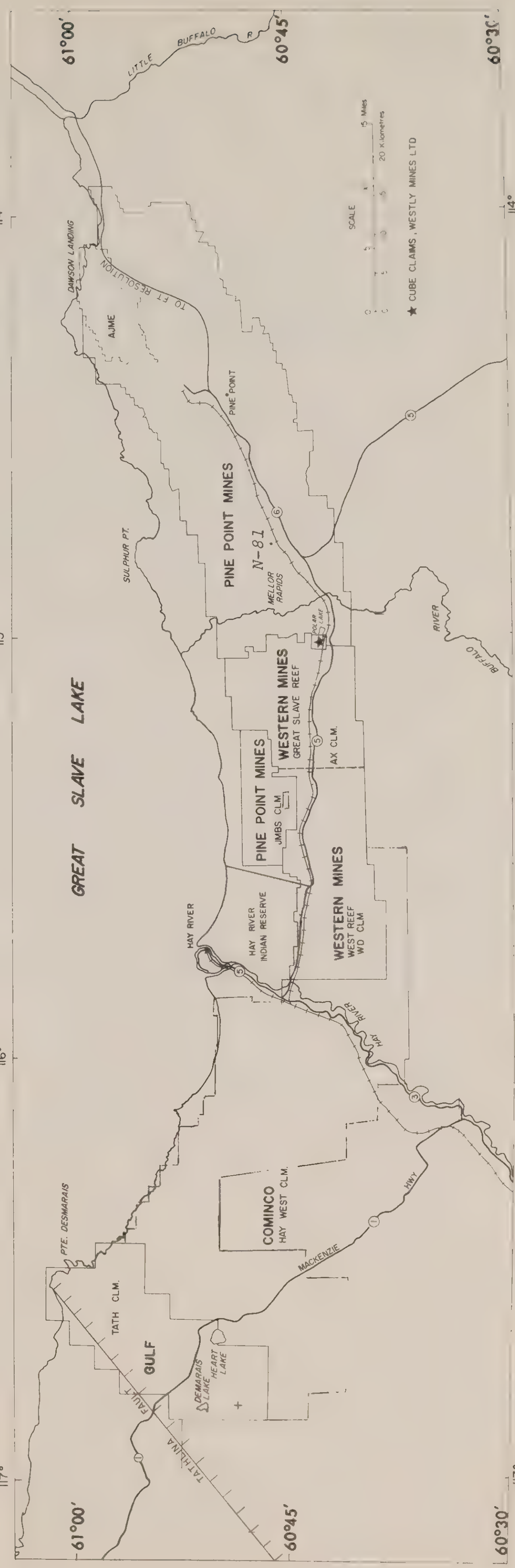


FIGURE 6-16: Claim ownership south and west of Great Slave Lake.

GREAT SLAVE REEF AND
WEST REEF PROJECTS

Westmin Resources Ltd.
Suite 904, 1055 Dunsmuir St.
P.O. Box 49066,
The Bentall Centre
Vancouver, B.C., V7X 1C4

Lead, Zinc
85 B/11-14
60°45'N,115°10'W

REFERENCES

Douglas and Norris (1974); Gibbins (1978, 1979, 1981, 1983a, 1984); Norris (1965); Skall (1975, 1976); Spencer and others (1980).

PROPERTY

2477 AX; WD; GSR; BES and MR claims.

LOCATION

The AX group or Great Slave Reef Project covers a 16 by 16 km area straddling NWT Highway 5 between the Buffalo River and Pine Point Ltd. holdings to the east and Birch Creek to the west (Fig. 6-16). The WD claims form a block 9.6 km wide by 25 km long between Birch Creek and Hay River. They are immediately west of the AX claims and are known as the West Reef Project.

HISTORY

Most of the area was staked between 1965 and 1967, but little exploration was done because target stratigraphic units are too deep to be tested by conventional geophysics.

During March and April, 1975, Western Mines Ltd. acquired the AX claims and entered a joint venture with DuPont of Canada Exploration Ltd. to explore them. The WD and GSR claims were staked early in 1976. Between November, 1975 and April, 1976, over 12,800 m were drilled in 72 holes on the AX group.

During 1976, 130 holes totalling 32,004 m were completed and the X-25 deposit was discovered and partly delineated. Reconnaissance or Phase I drilling traced the main reef (Presqu'ile Formation) at depths of 137 to 220 m over the entire strike length staked by Western Mines Ltd. (Gibbins, 1978 and 1979).

In the summer of 1977, 17,347 m of diamond drilling resulted in expansion of the reserves of the X-25 Zone and in the discovery of two additional mineralized zones (Gibbins, 1981). In 1978, 18,850 m of drilling identified and tested the R-190 and V-46 zones (Gibbins, 1983a).

Preliminary feasibility studies completed in November, 1979, resulted in a downward revision of the estimate of the undiluted mineral inventory for the R-190 and X-25 deposits and showed that these mineral deposits were not economically viable at current metal prices.

Significant drill intersections were given in previous Mineral Industry Reports (Gibbins, 1978, 1979 and 1983a).

Western Mines Ltd. continued their systematic exploration of the Great Slave Reef properties by diamond drilling 28,050 m (165 holes) in 1980 and 15,555 m (92 holes) in 1981. The 1980 drilling encountered two additional zones, O-556 and P-449, west of the original R-190 discovery.

DESCRIPTION

The 'Main Hinge Zone', along which many of the mineral deposits in the Pine Point District lie (Fig. 2 of Skall, 1975), extends westward across the AX and WD claims at a depth of over a hundred metres. This zone corresponds closely to the Devonian Pine Point barrier reef complex, which passes into time-equivalent evaporites (Muskeg Formation) and tidal flat deposits (J Facies of Skall, 1975) to the south, and shales to the north. Outlining the reef complex, now largely altered to coarse-grained dolomite known as Presqu'ile Facies, was the initial exploration goal.

According to Skall (1975, 1976), penecontemporaneous faults or hinge zones were instrumental in barrier complex facies development. These faults remained lines of weakness with occasional renewed movements and were enhanced during paleokarst development. They served as conduits for magnesium-rich brines that formed the Presqu'ile dolomite and localized lead-zinc deposition.

The joint venture group has been exploring a length of the barrier reef belt lying to the west of the Pine Point property. The ore-bearing formations lie at depths ranging from 150 to 300 m below surface. Exploration strategy has consisted of wide-spaced drilling to define the trend of the reef, followed by more closely spaced grid drilling along established mineralized trends. The size and shape of the targets has influenced drill-hole spacing.

Grid drilling in the vicinity of significant drill intercepts has resulted in four discoveries. Induced-polarization surveys have detected secondary features associated with two deposits. Rock geochemical and geological data have guided the discovery of another deposit. Trace-element halos are associated with the deposits and vary according to depositional style. These exploration guides, in

conjunction with grid drilling, are expected to become more important as target depths increase (Spencer and others, 1980).

CURRENT WORK AND RESULTS

Continued exploration drilling by Westmin Resources Ltd. in 1982 resulted in a better definition of high-grade cores in the P-499 and O-556 zones and in upgrading reserves in the R-190 zone to 1.08 million tonnes grading 17.8% combined lead-zinc. The 1983 drilling better defined the high-grade portions of the R-190 and X 25 deposits and a single hole drilled at the Z-155 deposit suggests a potential to increase tonnage and grade (Westmin Resources Ltd., 1983 Annual Report). Annual drilling from 1979 to 1983 has been 27,735 - 28,040 - 15,550 - 6,705 - and 11,275 metres.

To the end of 1983, Westmin has found seven mineral deposits with an aggregate tonnage of 6.3 to 8.1 million tonnes (depending on cut-off grade used), with a combined average grade of about 10% Pb + Zn. These deposits, designated X-25, W-19, V-46, Z-155, R-190, O-556 and P-499, are comparable in size and grade to those at Pine Point Mines, ranging from about 180,000 to greater than 2.7 million tonnes.

Future work will focus on mine evaluation with particular emphasis on hydrologic factors.

HAY WEST PROJECT

Cominco Ltd.	Lead, Zinc
7th Floor, 409 Granville St.	85 B/12,13;
Vancouver, B.C., V6C 1T2	85 C/9-11,14-16
	$60^{\circ}30'$-61°N,
	$115^{\circ}30'$-117°W

REFERENCES

Barbier (1983); Belyea (1971); Douglas (1970, 1974); Douglas and Norris (1974); Gibbins (1983b, 1984); Jamieson (1967); Macqueen and others (1975); Serres and Wiles (1978); Skall (1975, 1976); Williams (1977).

DIAND assessment report 081460.

PROPERTY

EL 1-75; EZ 1-20; HART 1-42; HAY 1-25; KAK 1-9; MAC 1-20; STRAW 1-7; TAT 1-11; XYL 1-6; ZM 1-6; BERRY 1; LAKE 1.

LOCATION

The property consists of 208 claims at the southwest end of Great Slave Lake and is centred 40 km west-southwest of Hay River (Figs. 6-16, 6-17). NWT Highways 1 and 2 provide all-weather access to much of the area. Winter roads provide access to the rest of the area.

HISTORY

Several oil and gas wells were drilled in the area during the 1950's (Belyea, 1971 and Williams, 1977). Cominco Ltd. and Pine Point Mines Ltd. staked the 2000-sq-km area in the summer of 1978. Samim and Aquitaine Co. of Canada have also entered into the joint venture.

Thirteen holes totalling 5,900 m were drilled on the Hay West property during 1979 (Gibbins, 1983b). This drilling confirmed the continuity of the favourable Presqu'ile dolomite, host rock of much of the ore in the Pine Point Lead-Zinc District. Trace amounts of lead and zinc were encountered and hydrogen sulfide gas was encountered at the top of the Slave Point Formation in three of the holes.

In March and April,1980, the STRAW, BERRY and XYL claims were added and in March,1981, the LAKE claim was staked bringing the Hay West claim block to a total of 223 claims (10,347 units). In June, 1981, 103 of the original claims were abandoned leaving a total of 120 claims (5223 units or 109,371 ha). The claim block now consists of the following claims:

EL 14-19, 21-39; HART 1-17, 19-20, 23, 26-29, 42; HAY 1-25; MAC 1-7, 9-12, 15-19; TAT 1-5, 7, 9, 11; ZM 1-6; STRAW 1-7; BERRY 1; XYL 1-6; and LAKE 1.

During the period 1979-1981, 42 holes totalling 19,422.9 m were drilled on the Hay West project claims: 5894.7 m (13 holes) in 1979, 9702.7 m (19 holes) in 1980 and 3825.5 m (10 holes) in 1981. Most of the holes were drilled on a reconnaissance grid designed to provide a regional geologic map of the property, using geological descriptions, rock geochemistry and geophysical logging of selected holes.

The reconnaissance grid drilling was successful in defining the approximate limits of the Muskeg Formation evaporite facies, distinctive back reef and main reef trends of the Pine Point barrier complex, and the approximate position of the Pine Point Formation-Sulphur Point Formation shale-out towards the western edge of the property. Two of the 1981

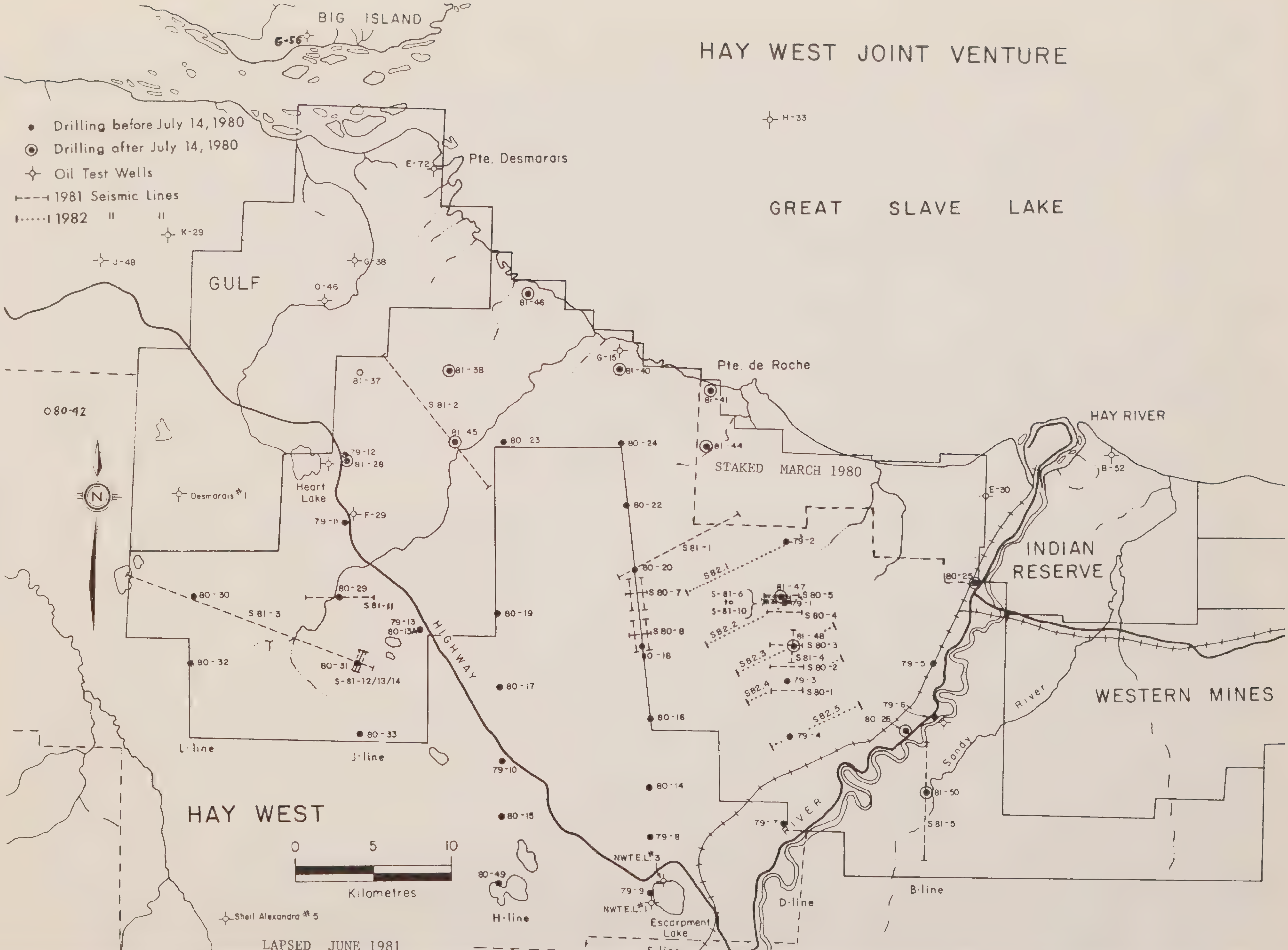


FIGURE 6-17: Plan of Hay West joint venture showing seismic lines and drill holes.

holes (W-81-47 and 48) were drilled to test collapse features outlined during 1980 and 1981 seismic surveys (Fig. 5-16 of Gibbins, 1984).

In 1980, several holes encountered hydrogen sulphide gas and had to be abandoned. Hole HW-80-49 was abandoned and cemented off due to a blow-out of crude oil, methane and hydrogen sulfide gas, emulsified oil-water and water at 453.2 m. In the 1981 program, all drilling contractors were required to use blow-out prevention equipment, H_2S detectors, large heated mud-tanks and a prescribed mud program.

In 1980 and 1981, 66.3 and 75.6 line-km of Mini-Sosie seismic profiles were run in areas of anomalies interpreted as reef or collapse zones (Fig. 6-17). The Mini-Sosie seismic reflection system is a patented process developed by Societe National Elf-aquitaine (Production) Ltd. It is used in shallow (30-1200 m range) high-resolution seismic exploration. The technique and equipment are described by Serres and Wiles (1978) and Barbier (1983). The Hay West surveys were carried out in the spring of the year, while the ground was still frozen, by Compagnie Generale de Geophysique of Calgary. The object of the surveys was to map the Hay River Formation-Slave Point Formation interface and to search for other recognizable features in the Slave Point and Pine Point Formations.

DESCRIPTION

Outcrop in the property area is sparse and mainly confined to the Hay River Escarpment (Jamieson, 1967). Consequently, subsurface geological information obtained from drilling and seismic work is necessary to define the geological framework of the area (Belyea, 1971; Douglas 1970, 1974; Macqueen and others, 1975; and Williams, 1977).

The Hay West area straddles the extension of the Devonian barrier reef complex (Skall, 1975, 1976) and the westward extension of the Slave-Chantrey mylonite zone (McDonald fault) in the Precambrian basement. The Tathlina Uplift to the west is a basement high that was subjected to periodic uplift during much of the Middle Devonian and consequently controlled sedimentary facies during this time (Belyea, 1971). The Tathlina Uplift is related to prominent northeasterly trending lineaments crossed by less prominent northwesterly trending lineaments.

Deposition of the Middle Devonian Slave Point Formation was followed by uplift and erosion. Onlap of the Upper Devonian (Hay River Formation shales) marked a complete change of depositional and tectonic style. Recrystallization of Sulfur Point Formation and Upper Pine Point Formation strata to coarse crystalline dolomite seems to follow the northeasterly trends and the break between the Pine Point-Muskeg and Sulfur Point Formations (Belyea, 1971).

CURRENT WORK AND RESULTS

Between December 14, 1981 and January 30, 1982, 58 line-km of seismic data was collected in the east central part of the Hay West claim block (Fig. 6-17). Figure 6-18 is taken from line S82-3 and shows what is believed to be the Hay River Formation-Slave Point Formation interface and a possible collapse feature below it.

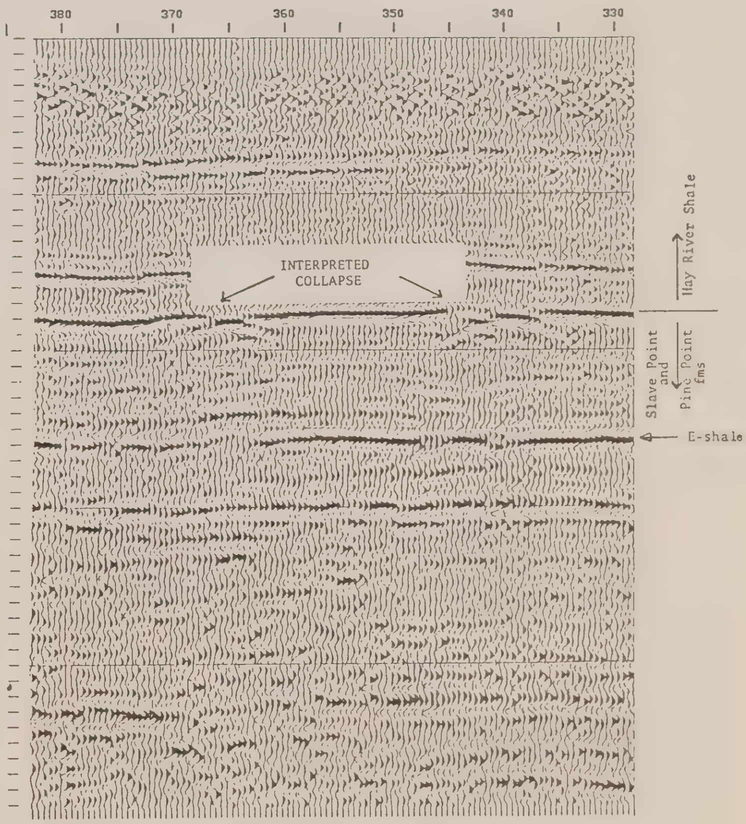


FIGURE 6-18: Portion of seismic line S82-3 in the vicinity of drill hole 81-48 showing interpreted collapse and geologic markers (from DIAND assessment report 081483)

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CHAPTER 7: BEAR STRUCTURAL PROVINCE

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INTRODUCTION

The geology of the Bear Structural Province (Fig. 7-1) has been summarized in several previous Mineral Industry Reports (Seaton, 1978, 1981, 1983a, 1984; Seaton and Hurdle, 1978). In this report no attempt is made to summarize the geology beyond a statement of the geological subdivisions under which the properties have been grouped. Several Geological Survey of Canada and university thesis projects are in progress covering parts of the Bear Province and it is anticipated that soon a drastically revised geological summary may be required.

The East Arm Subprovince, though geologically included with the Bear Province, is covered in Chapter 6 of this Mineral Industry Report.

Primary grouping of properties in this section is under the headings: 1) Wopmay Orogen, and 2) Amundsen Basin-Wopmay Orogen (where properties and projects span or lie close to the Aphebian-Helikian unconformity).

Within this framework a secondary arrangement of properties in alpha-numerical sequence of NTS references is used.

References relating to individual property descriptions are listed separately in the appropriate sections. General information on the Bear Structural Province and detailed reports on mapping of specific areas of the Bear Province include those by: Allan and Cameron (1973); Badham (1972, 1976, 1978); Baragar and Donaldson, (1973); Campbell (1978, 1979); Campbell and Cecile (1975, 1976a,b,c, 1979); Cecile and Campbell (1977); Easton (1980); Fraser (1964, 1974); Fraser and others (1972); Gibb (1978); Grasty and Richardson (1972); Grotzinger (1982); Henderson, J.F. (1949); Hildebrand (1981, 1982); Hoffman (1973, 1977, 1978, 1980a,b); Hoffman and Bell (1975); Hoffman and Cecile (1974); Hoffman and Henderson (1972); Hoffman and McGlynn (1977); Hoffman and others (1970, 1977, 1978, 1980); Hoffman and Pelletier (1982); Kerans and others (1981); Kidd (1936); Kindle (1972); Lord (1941, 1942, 1951); Lord and Parsons (1952); Miller (1982); McGlynn (1957, 1974, 1975, 1976, 1977, 1980); McGlynn and Ross (1963); Mursky (1963, 1973); Padgham and others (1974); Shegelski and Murphy (1972); Shegelski and Thorpe (1972); Smith (1962, 1967); St-Onge and Hoffman (1980); Thorpe (1970); Tremblay (1971); Wilson and Lord (1942).

Most figures in this section of the 1982-1983 Mineral Industry Report are from McGlynn's 1977 1:1,000,000 geological compilation (Geol. Surv. Can. Open File 445). Though this is adequate to show the gross geological settings of properties, it requires updating.

An appendix to Chapter 7 on page 286 gives a rough indication of relative expenditures by companies on various projects in various areas and provides a comparison with expenditures in the Slave Structural Province.

WOPMAY OROGEN

The Wopmay Orogen (Hoffman, 1981) comprises Aphebian sediments, volcanics and plutons to the east of Great Bear Lake. From east to west, the Wopmay Orogen includes the following (Fig. 7-1):

a) Epworth Group sediments of the autochthonous zone.

b) Epworth Group sediments and volcanics of the Asiak Fold and Thrust Belt.

c) Epworth and Akaitcho Group metasediments and metavolcanics of the Hepburn Metamorphic-Plutonic Belt.

d) The Great Bear Volcano-Plutonic Complex, which comprises mainly synvolcanic granitoid plutons and associated, largely subaerial, volcanics of the McTavish Supergroup. Parts of the complex are underlain by sediments and intrusive quartz porphyry or quartz-feldspar porphyry.

e) The Hottah Terrane, which consists of metamorphic rocks of uncertain, though probably Aphebian, age exposed in the Hottah Lake and Leith Peninsula areas.

MAIN GEOLOGICAL DIVISIONS

(Pal) Paleozoic cover
BEAR STRUCTURAL PROVINCE
PROTEROZOIC
HADRYNIAN
R RAE GROUP and Coronation Sills

NEOHELIKIAN
Nv COPPERMINE RIVER GROUP; basalt, sandstone, siltstone

PALEOHELIKIAN
Ho Di DISMAL LAKES GROUP; dolomite overlying red mudstone, sandstone and black shale.

HORNBY BAY GROUP
Sandstone, siltstone, shale, dolomite, conglomerate.

MAIN GEOLOGICAL DIVISIONS

BEAR STRUCTURAL PROVINCE
PROTEROZOIC
APHEBIAN

GBB Great Bear Volcano-Plutonic Complex: Includes the McTavish Volcanics Supergroup (Hoffman, 1978) and plutons of the Great Bear Batholith

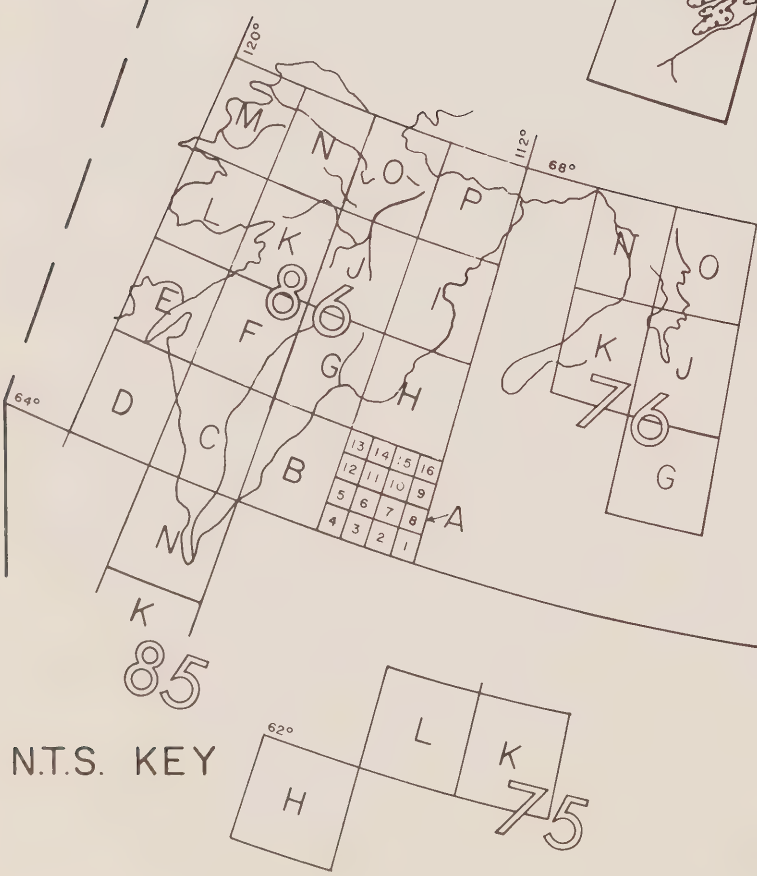
H Hepburn Metamorphic-Plutonic Belt: Includes the Akaitcho Group and some metamorphosed rocks of the Epworth and Snare Groups.

EA East Arm Subprovince
G Goulburn Group
E Epworth Group
Sna Snare Group

Note: East Arm Subprovince is not reported in Chapter 7.

(C) CHURCHILL STRUCTURAL PROVINCE, PROTEROZOIC AND ARCHEAN

(S) SLAVE STRUCTURAL PROVINCE, ARCHEAN



N.T.S. KEY

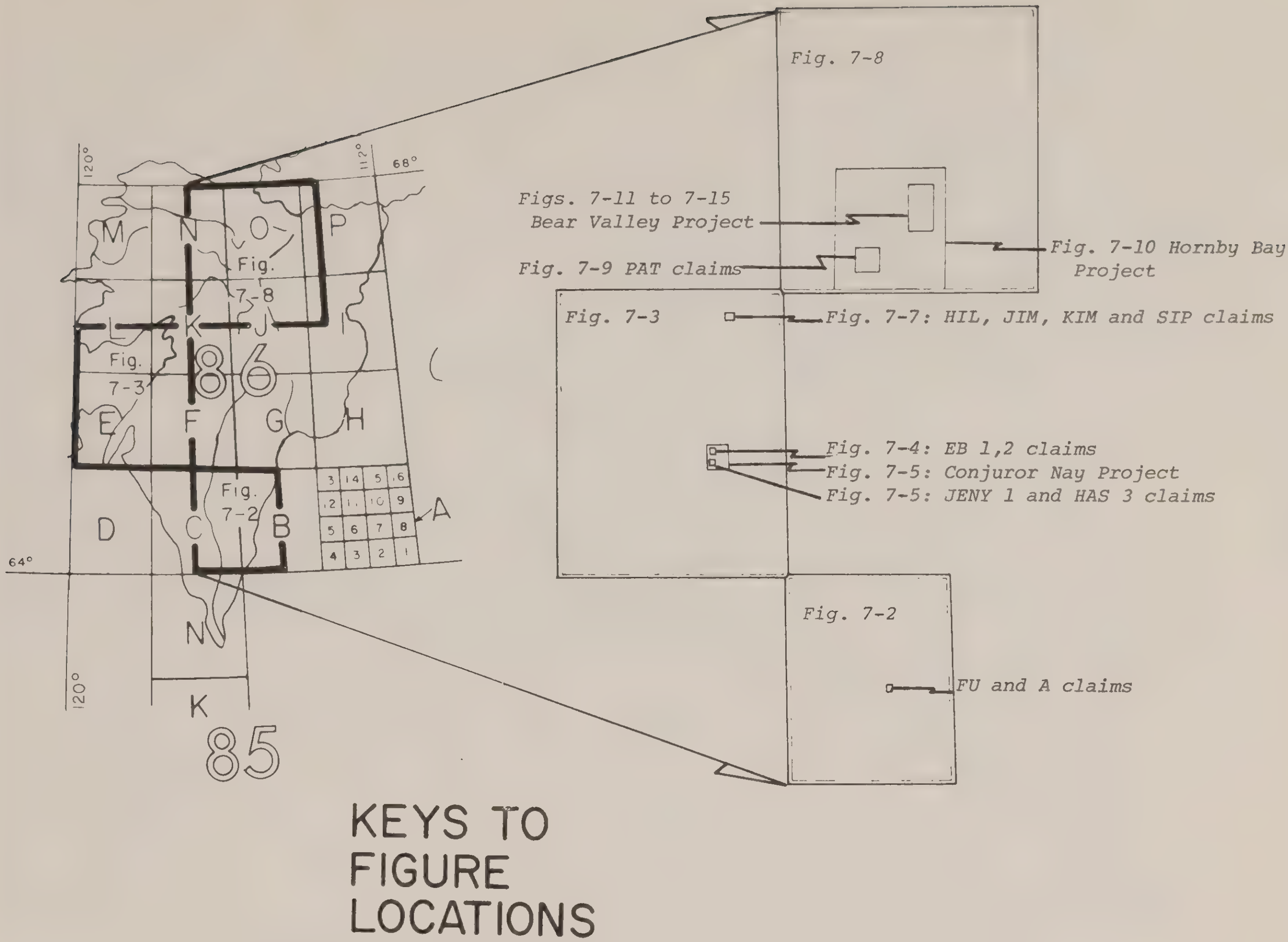
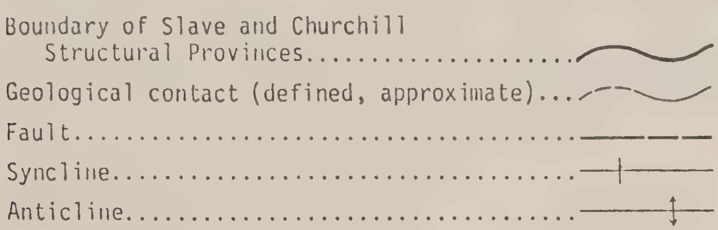


FIGURE 7-1: Bear Structural Province. Map showing geological divisions, NTS coverage and figure location maps.

THESE SYMBOLS ARE COMMON TO ALL FIGURES IN CHAPTERS 7 AND 8



Not reported separately in this section are diamond drilling by Terra Mines Ltd. at their Silver Bear-Norex-Smallwood Lake mines and adjoining property (86 E/9) and by Barons Oil Ltd. on their BO claims (86 E/9) on the Camsell River.

A, FU CLAIMS

G. Ryznar	Gold, Silver
4405 Glencanyon Dr.	86 B/5
N. Vancouver, B.C., V7N 4B4	64°27'N, 115°44'30"W

LEGEND

Hb	Gabbro sills and sheets

APHEBIAN

GREAT BEAR BATHOLITH

Ad	Granodiorite, quartz monzonite, granite
EApwv	Eastern sequence: greywacke mudstone turbidites, quartzite, shale, arkose, ash flow tuffs, basalts
UAv	Volcanic flows and tuffs, sedimentary rocks, felsite intrusions undivided

HEPBURN METAMORPHIC-PLUTONIC BELT

Ag	Granodiorite, quartz monzonite, granite
An	Migmatite, veined gneiss, granitic gneiss, includes undifferentiated metamorphosed Snare or Epworth rocks

SAsdr	Metamorphosed Snare rocks

SNARE GROUP

SAvb	Basalt, tuff, minor chert
SAs	Siltstone, shale, quartzite, dolomite, minor intermediate volcanic rocks

ARCHEAN

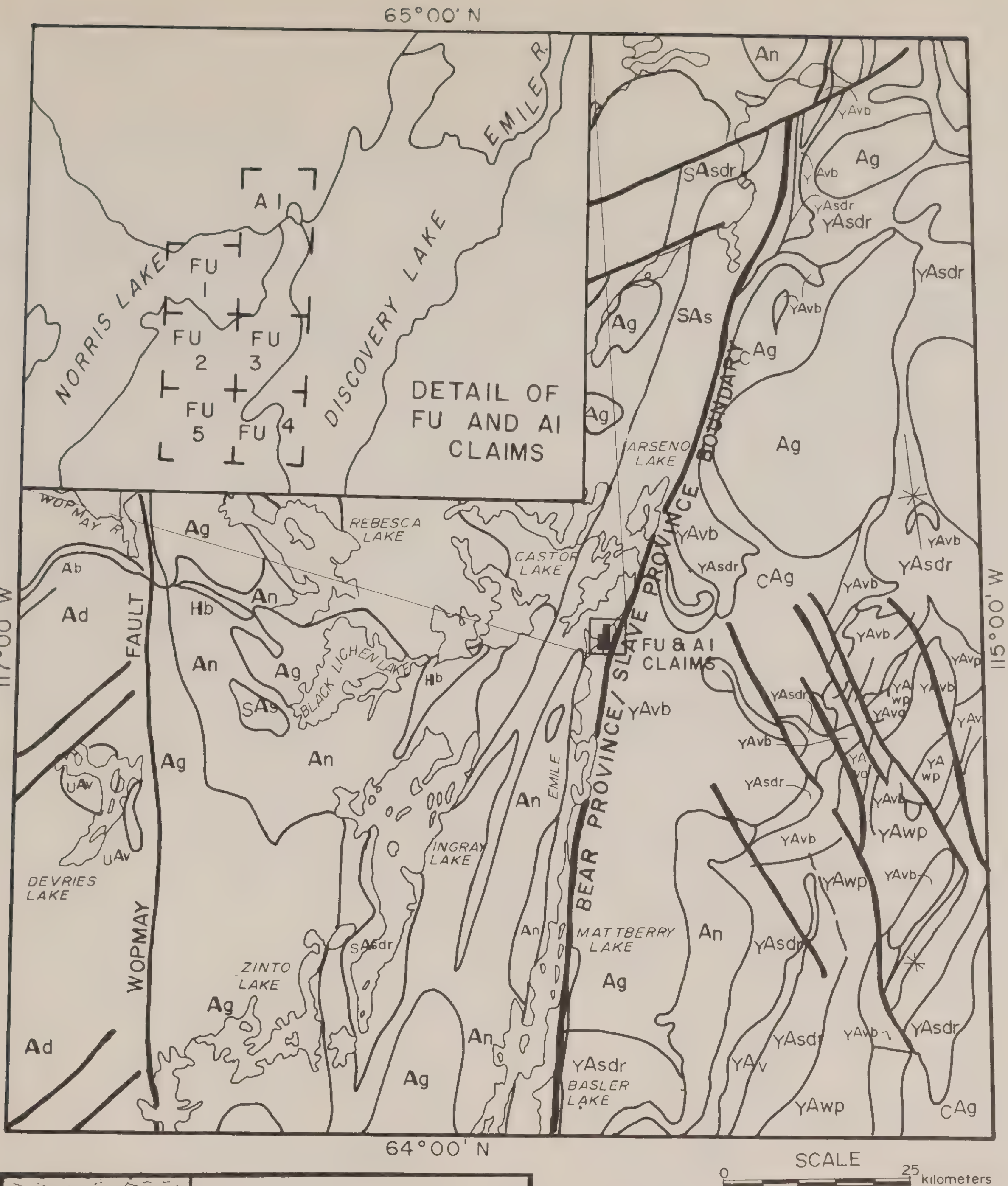
Note: The sequence of units of the Yellowknife Supergroup does not correspond to their stratigraphic sequence.

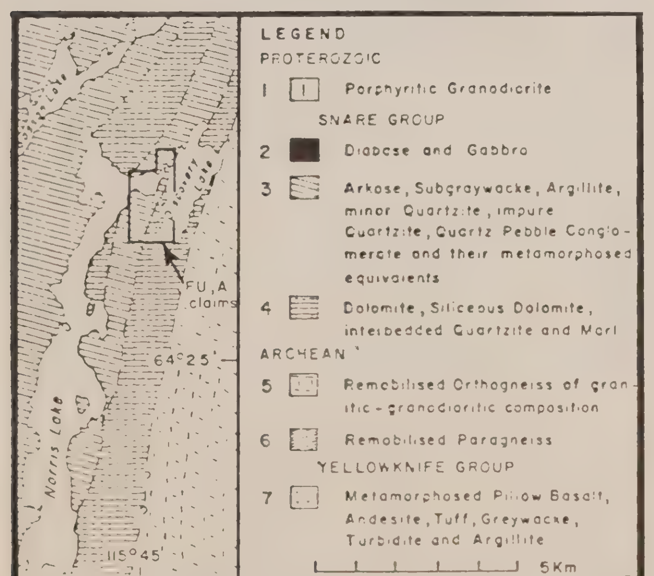
YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks

YELLOWKNIFE SUPERGROUP

YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAva	Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks
YAv	Volcanic rocks, undivided

CAg	Complex of plutonic gneisses, commonly of tonalite composition, in part cataclastic, that are basement to Yellowknife Supergroup. May include some younger plutonic rocks.





Inset (bottom left) from Neilsen 1978

FIGURE 7-2: Mattberry Lake, Emile, Wopmay and Acasta Rivers area. Regional geology and property locations. Geology from McGlynn (1977)

REFERENCES

Broughton (1972); Frith (1973, 1978); Lord (1942, 1951); Padgham and others (1978); Thorpe (1966).

DIAND assessment report 081700.

PROPERTY

A 1; FU 1-5.

LOCATION

The claims are 235 km north-northwesterly of Yellowknife between Norris and Discovery Lakes.

HISTORY

The claims were first staked as the MIDAS claims in 1938 when gold was discovered there. In 1945, the claims were restaked as the AVIS and AS claims. After drilling by Doris Yellowknife Gold Mines Ltd. in 1946 and 1947, the claims lapsed (Lord, 1951). The claims were re-staked in 1965 as the HID 1-6 and MW 1-6 claims (Thorpe, 1966) and optioned by Prosper Oils Ltd. In 1968, Granex Mines Ltd. re-staked the claims as the KT group, and carried out detailed mapping and sampling in 1969 (Padgham and others, 1978).

The present claims, A 1 and FU 1-5, were recorded in December, 1974 by A. Shearcroft and transferred to G. Ryznar in March, 1982.

DESCRIPTION

Figure 7-2 shows the regional geology of the area. Other geological maps include those by Lord (1942) and by Broughton (1972) at 1:253,440 and 1:4200 respectively. Geology and metamorphism are further discussed in Frith (1973, 1978).

CURRENT WORK AND RESULTS

In 1983, a petrographic study was made of polished thin sections from seven samples taken from a trench in the main mineralized zone on the FU 2 claim (Fig. 7-2). The samples were analyzed for silver and gold. Assays ranged from 0.5 to 530 ppm Ag and less than 10 to 18000 ppb Au. Results of the petrographic study showed an association of gold with arsenopyrite and of silver with galena.

EB CLAIM

E. Buhlmann	Silver
10408 - 31 Ave.	86 E/9 NE
Edmonton, Alta., T6J 2Y3	$65^{o}40.5$'N, $118^{o}04$'W

REFERENCES

Hildebrand (1984).

DIAND assessment report 081616.

PROPERTY

EB 1, 2.

LOCATION

The claims (Figs. 7-3, 7-4) are 410 km northwesterly of Yellowknife.

HISTORY

The property was formerly staked in 1976 and 1977 as the FO 1, 2 claims.

The EB 1 claim was recorded in February of 1981 and the EB 2 claim in March of 1983.

DESCRIPTION

The regional geology is shown in Figure 7-3. Hildebrand (1984) provides a more detailed and up-to-date map at 1:50,000.

CURRENT WORK AND RESULTS

The property was explored by geological mapping, excavating one trench and prospecting.

Silver was not found. Quartz-carbonate veins and pyritic tuff erratics were observed.

LEGEND

Hb Gabbro sills and sheets.

HELIKIAN

HORNBY BAY GROUP

$_H$Hss' Sandstone, minor conglomerate

$_H$Hs Hornby Bay Group undivided

APHEBIAN

GREAT BEAR BATHOLITH

Ad Granodiorite, quartz monzonite, granite

$_C$Avps Central sequence: intermediate to acidic ash flow tuffs, air fall tuffs with minor interbedded volcanogenic sedimentary rocks

$_W$Avs Western Sequence: basalt, andesite, rhyodacite, ash flow tuffs, quartzite, mudstone, conglomerate, chert. Related porphyry intrusions.

Ap Felsite porphyry intrusions, commonly intrusive equivalents of enclosing volcanic rocks

PROPERTIES

1 EB 1,2

2 JENY 1

3 HAS 3

4 Conjuror Bay Project

5 HIL, JIM, KIM, SIP

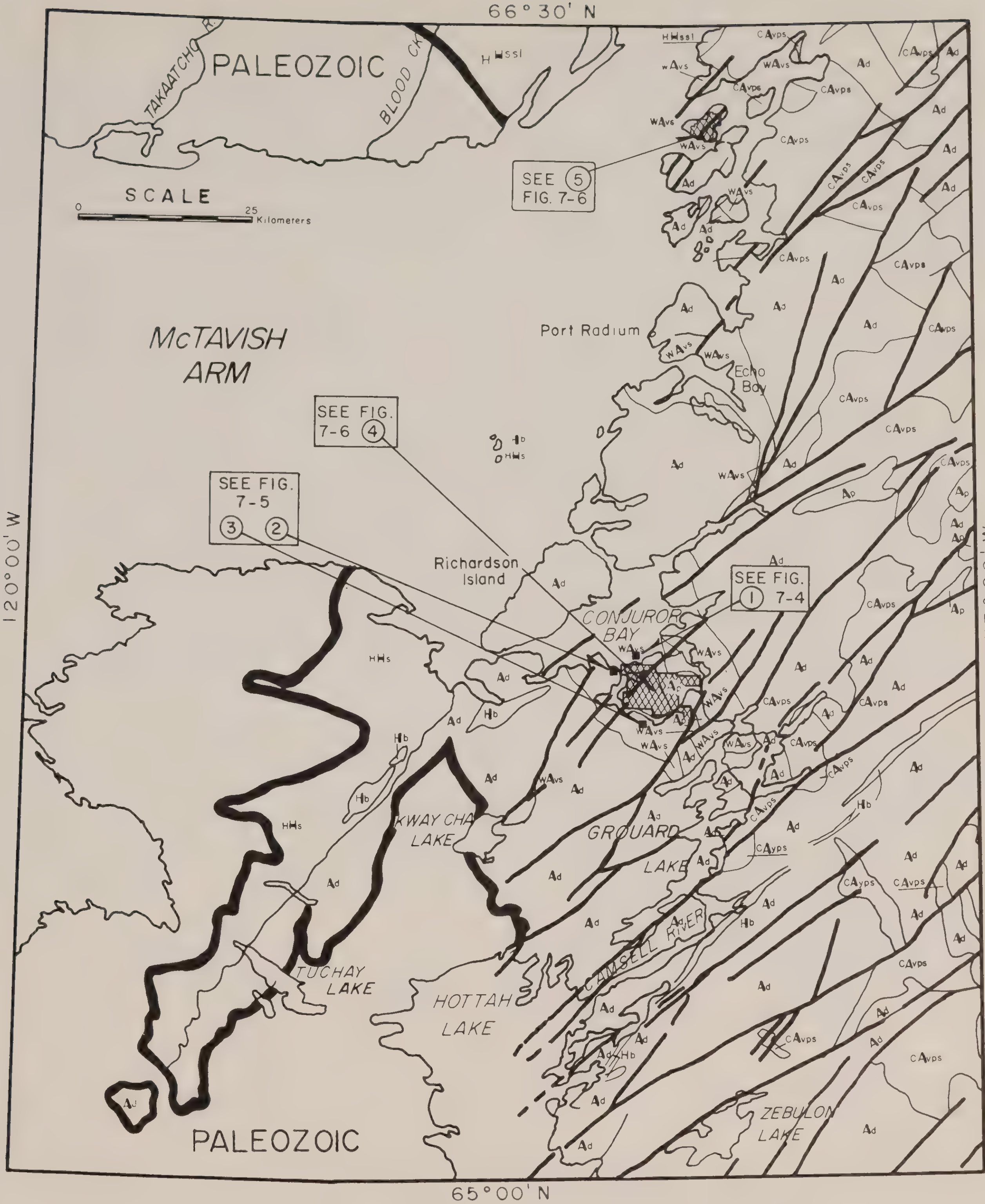


FIGURE 7-3: Great Bear Lake, McTavish Arm. Regional geology and properties. Geology from McGlynn, (1977).

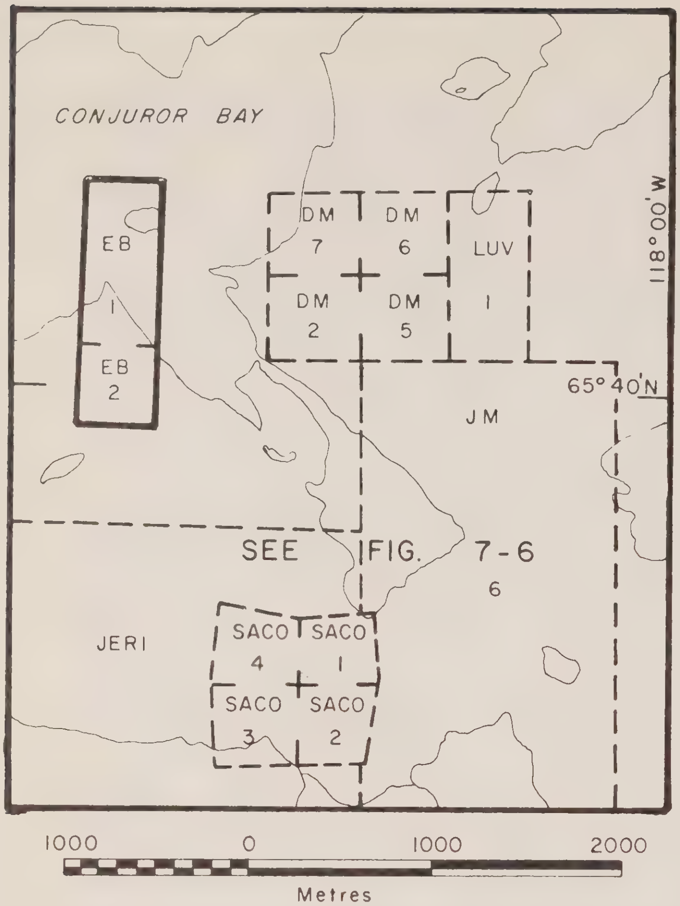


FIGURE 7-4: Location of EB 1,2 claims

HAS 3 CLAIM

Terra Mines Ltd.	Silver
202, 7608 - 103 St.	86 E/9 NE
Edmonton, Alta., T6E 4Z8	$65^{0}36'$N, $118^{0}07'$W

REFERENCES

Hildebrand (1984).

DIAND assessment reports 108177, 018858.

PROPERTY

HAS 3.

LOCATION

The claim (Figs. 7-3, 7-5) is 400 km northwesterly of Yellowknife.

HISTORY

Magnet Exploration Ltd. staked the property as part of the BELL claim group in the 1960's. HAS 3 was recorded in May of 1980 by Terra Mines Ltd.

DESCRIPTION

The regional geology is shown in Figure 7-3. Hildebrand (1984) provides a more detailed and up-to-date map at 1:50,000.

CURRENT WORK AND RESULTS

Geological mapping, prospecting and a VLF-EM survey were done over part of the HAS 3 claim. Outcrops of syenite and granite were mapped and three EM conductors were attributed to overburden sources.

Chalcopyrite, pyrite, arsenopyrite and fluorite were found in angular boulders of 1 or 2 metres diameter. The sulphides are in veins, lenses and pods in the boulders.

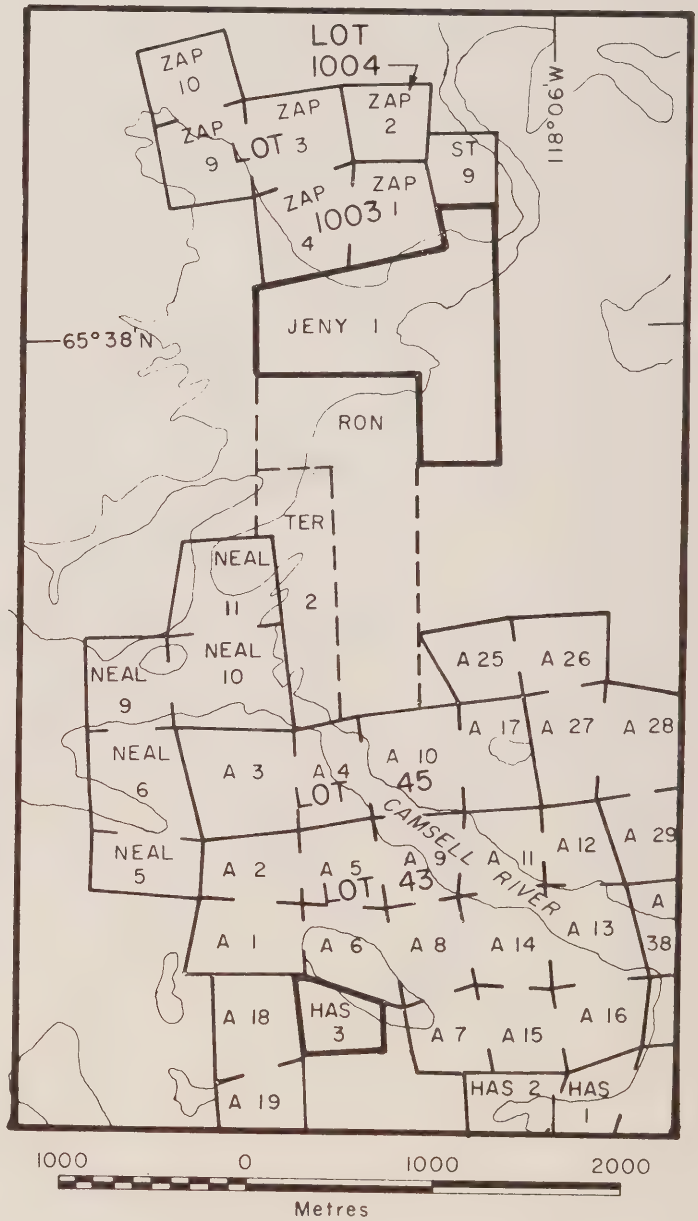


FIGURE 7-5: Location JENY 1 and HAS 3 claims relative to nearby properties

JENY 1 CLAIM

Terra Mines Ltd.	Silver
202, 7608 - 103 St.	86 E/9 NE
Edmonton, Alta., T6E 4Z8	65°38'N, 118°07'W

REFERENCES

Gibbins and others (1977); Hildebrand (1984); Seaton (1981); Seaton and Hurdle (1978).

DIAND assessment reports 081576, 060426.

PROPERTY

JENY 1.

LOCATION

The claims (Figs. 7-3, 7-5) are 405 km northwesterly of Yellowknife.

HISTORY

Trenching and mapping have been done intermittently on the property since at least as early as the mid-1960's. It was staked by Indian Mountain Metal Mines Ltd. in 1966 as part of the X claim group and restaked as part of the AN group in 1968. Bitter Creek Mines Ltd. held the property in the late 1960's and early 1970's. In 1973 the ground was covered by the MR, ZAP and BIDA 6 claims and later in the 1970's by the ZAP and ST claims (Seaton, 1981; Seaton and Hurdle, 1978; Gibbins and others, 1977). JENY 1 was recorded in September of 1980.

DESCRIPTION

The regional geology is shown in Figure 7-3. Hildebrand (1984) provides a more detailed and up-to-date map at 1:50,000.

CURRENT WORK AND RESULTS

Two man-days were spent during 1982 in cursory geological mapping and in sampling an old trench. Samples were analysed for silver, copper, bismuth, nickel, lead and zinc. Rocks mapped on and adjacent to the property included calcareous argillite, limey chert, siltstone and gritstone, sandy tuff and gabbro.

CONJUROR BAY, BALACHEY AND RAINY LAKES PROJECT

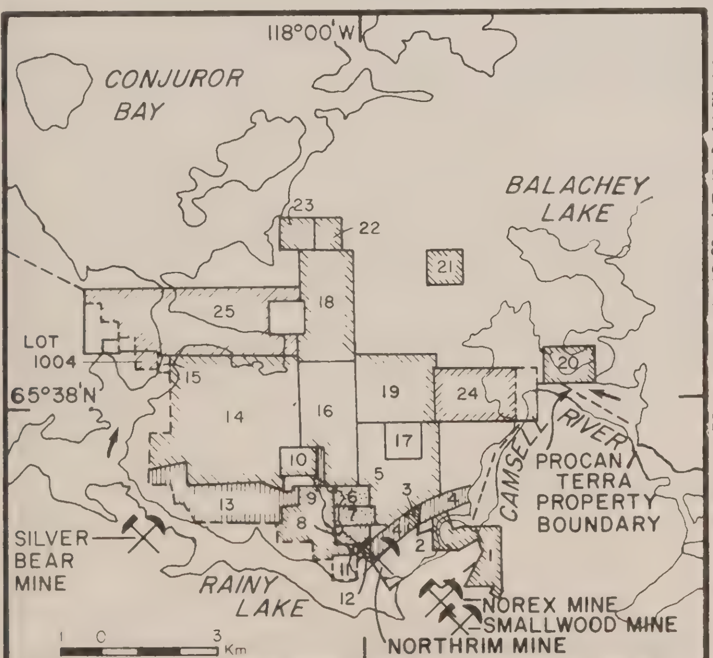
Procan Exploration Company Ltd.	Silver
880 Guiness House	86 E/9, 86 F/12
727 - 7th Ave. S.W.	65°38'N, 118°00'W
Calgary, Alta., T2P 0Z5	

REFERENCES

Caine and others (1981); Hildebrand (1984); Lord (1941, 1951); Padgham and others (1975); Seaton (1978); Seaton and Hurdle (1978); Thorpe (1972).

DIAND assessment reports 081681, 081711.

Northrim Mines Ltd. | N.B. Hunt (50%) W.H. Hunt (25%) L. Hunt (25%) | N.B. Hunt, W.H. Hunt, L. Hunt/Terra Mining and Expl. Ltd. | Other ground explored by agreements



PROPERTIES

1	BARRY, FRED, WAYNE	13	A25-38
2	LK 1	14	TER 1
3	STANGE 1,2	15	ST 9
4	WOLF	16	JM 5
5	CR 2	17	JM 4
6	LARRY	18	JM 6
7	GLADYS	19	CR 1
8	MANDY	20	JM 1
9	CATHY 1,2, 5-12	21	JM 3
10	CATHY 13-16	22	LUV 1
11	CATHY 17	23	DM 2,3,6,7
12	HERBIE 1	24	JM 2
		25	JERI

NOTES: 1 A25-38 recorded in June 1952 by McNeice and Blanchet

2 Centre of project area is roughly 395 km northwesterly of Yellowknife

FIGURE 7-6: Conjuror Bay Project; claims, ownerships and nearby mines

PROPERTY

The claims are listed in Table 7-1.

LOCATION

The project area (Figs. 7-3, 7-6) lies between Rainy Lake and Balachey Lake, both of which are on the Camsell River, and Conjuror Bay of Great Bear Lake. The centre of this area is 400 km northwesterly of Yellowknife.

PROPERTY

The claims and their ownerships are listed in Table 7-1 and shown in Figure 7-6.

HISTORY

The area has been explored and prospected since the 1940's. A general view of the history of the project area may be obtained in Lord (1941, 1951); Padgham and others (1975); Seaton (1978); Seaton and Hurdle (1978); Thorpe (1972) and from the numerous assessment reports listed by Caine and others (1981).

The dates on which the various claims were recorded are shown in Table 7-1.

DESCRIPTION

The regional geology is shown in Figure 7-3. The geology of the Rainy Lake and White Eagle Falls area is shown in more detail by Hildebrand (1984).

CURRENT WORK AND RESULTS

In 1983 the claims listed in Table 7-1 and certain adjoining ground were explored by prospecting, lithogeochemical sampling and geochemical soil sampling. Between 300 and 400 rock samples and a similar number of soil samples were collected. Of these, between 200 and 300 each of rock and soil samples were collected on the claims listed in Table 7-1, and the remainder from adjacent properties which include claims LK 1, LM 1-8, WOLF 3-5, 6-8 and A 25-38. Approximate sample density on each claim expressed as hectares per sample is also shown in Table 7-1 and indicates a concentration of work on the JM 4, on the DM and LUV, on the ST 9 and on several claims north and northwest of Northrim Mine. Distribution of sampling within individual claims is by no means even and tends to be localized along and

TABLE 7-1:CLAIM, OWNERSHIP AND SAMPLING DATA FOR CONJUROR BAY PROJECT

CLAIM	DATE RECORDED	AREA (ha) (APPROXIMATE)	OWNER*	APPROXIMATE AREA PER SAMPLE (ha) ROCKS	SOILS
BARRY	MAY 14, 1982	11			
FRED	MAY 14, 1982	164		1:100	
WAYNE	MAY 14, 1982	17			
STRANGE 1-2	AUG 03, 1982	42		1:7	1:14
LARRY 1-2	JUL 15, 1974	42	Northrim Mines Ltd.	1:7	
GLADYS 1-2	JUL 15, 1974	42	Northrim Mines Ltd.	1:7	1:7
MANDY 1-3	JUL 15, 1974	53	Northrim Mines Ltd.		
HERBIE 1	NOV 01, 1982	16			
CATHY 1-2 5-12	JUL 17, 1975	209		1:17	1:100
CATHY 13-17	SEP 25, 1975	105		1:7	1:8
TER 1	AUG 27, 1979	968		1:25	1:14
JERI	DEC 12, 1981	815	N.B. Hunt, W.H. Hunt, L. Hunt/ Terra Mining and Exploration Ltd.	1:50	1:33
ST 9	MAR 22, 1976	21		1:7	1:35
JM 1	FEB 11, 1981	125		1:13	1:100
JM 2	FEB 11, 1981	376	N.B. Hunt, W.H. Hunt, L. Hunt/ Terra Mining and Exploration Ltd.	1:100	
JM 3	FEB 11, 1981	84		1:25	1:9
JM 4	FEB 11, 1981	84		1:1.5	1:2
JM 5	FEB 11, 1981	397		1:>100	1:100
JM 6	FEB 11, 1981	376		1:>100	1:8
CR 1	MAR 21, 1983	418		1:>100	
CR 2	MAR 21, 1983	502		1:25	1:33
DM 2-3, 6-7	JUL 07, 1975	84		1:10	1:3
LUV 1	APR 22, 1982	42		1:4.5	1:2

* Unless otherwise indicated, mineral claims are owned by N.B. Hunt (50%), W.H. Hunt (25%), L. Hunt (25%).

* 1:25 = 1 sample per 25 ha.

around veins and gossans. Old trenches were also sampled.

All rock samples were assayed for copper and silver and selected rock samples were also analysed for one or more of arsenic, gold, lead and zinc. Soil samples were analysed for copper, silver and arsenic.

Veins within the project area were reported to be of three types: barren quartz veins and stockworks, veins containing alternately banded cherty quartz with usually greater amounts of coarse-grained carbonate, and veins consisting predominantly of quartz with lesser amounts of fine-to-medium-grained carbonate. Silver-bearing minerals were noted only in mainly quartz-bearing veins at the Borthwick Shaft of Northrim Mine on the LM 1-8 mining lease. Concentrations of several percent copper, as chalcopyrite or less commonly bornite, were found locally in veins containing alternate layers of quartz and carbonate. Geochemically anomalous but not economically significant silver concentrations were found with chalcopyrite and bornite. Veins were found to be poorly developed within gossan-capped sulphide zones and within the magnetite-apatite-actinolite and the albite alteration zones of the Balachey Pluton. These zones (Hildebrand, 1984) underlie much of the eastern part of the property to the east of a narrower pyrite-chalcopyrite zone which trends northwesterly through the central part of the project area, and which underlies the Northrim, Norex and Smallwood Mines.

HIL, JIM, KIM AND SIP CLAIMS

B. P. Canada Inc.	Uranium, Copper
Selco Mining & Minerals Div.	86 K/5
1700 - 55 University Ave.	$66^{0}22'$N, $117^{0}45'$W
Toronto, Ont., M5J 2H7	

REFERENCES

Caine and others (1981); Hildebrand (1983a); Hoffman (1978); Seaton (1981, 1983a,b).

DIAND assessment report 081624.

PROPERTY

HIL 1-12; JIM 1-15; KIM 1-34; SIP 1-22.

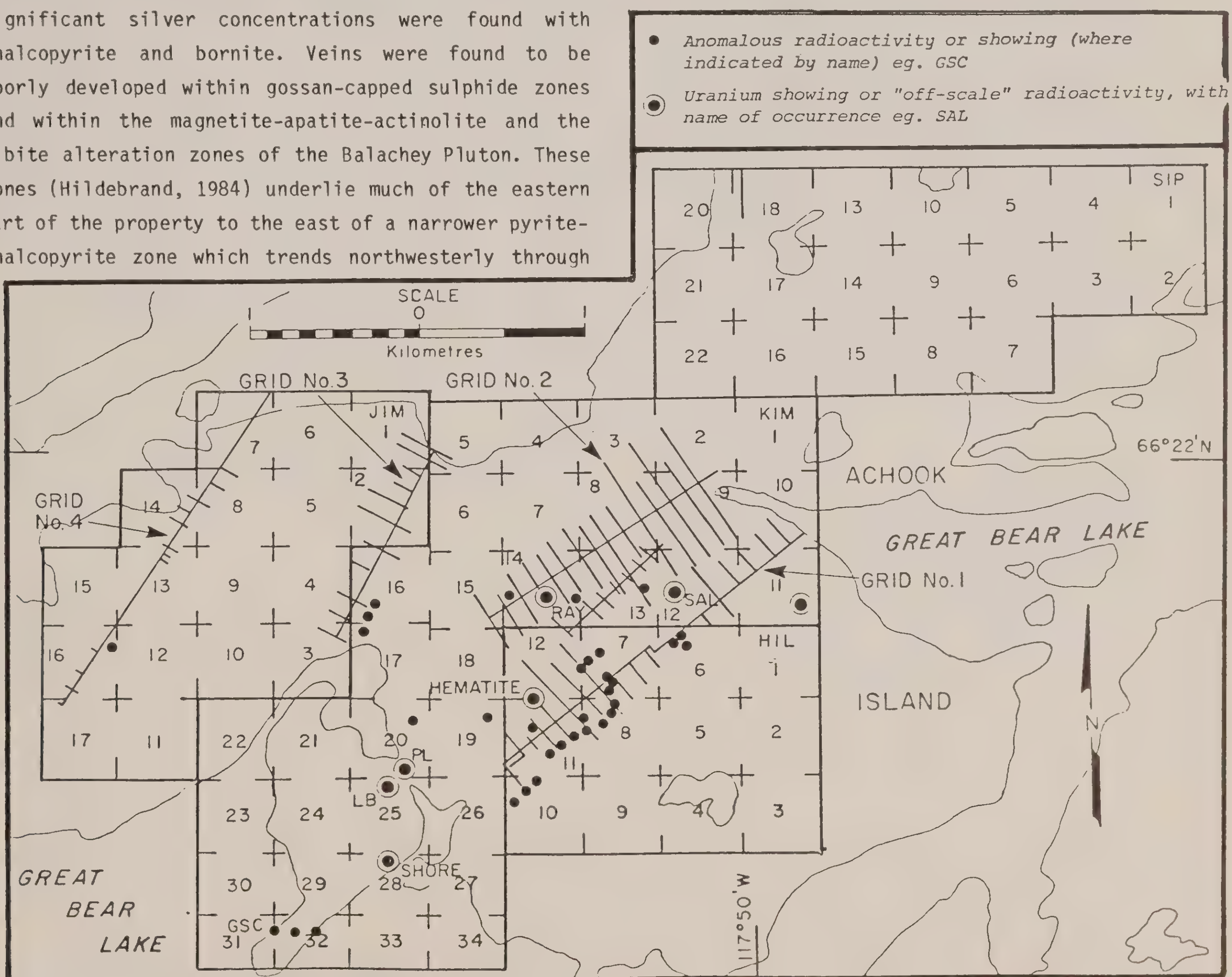


FIGURE 7-7: Grids, uranium showings and occurrences of anomalous radioactivity on HIL, JIM, KIM and SIP claims.

LOCATION

The claims are on Achook Island in the McTavish Arm of Great Bear Lake, 480 km north-northeasterly of Yellowknife (Figs. 7-3, 7-7).

HISTORY

The exploration history of the claims was reviewed by Seaton (1981, 1983a,b). Relevant assessment reports are listed by Caine and others (1981). The HIL, JIM and SIP claims were staked in 1977 and the KIM claims in 1978.

DESCRIPTION

The regional geology is shown in Figure 7-2 and in much revised, more detailed form by Hoffman (1978) at 1:125,000. Hildebrand (1983a) has mapped and compiled the geology of the Echo Bay - MacAlpine Channel area. The compilation is at 1:50,000.

The property is underlain mainly by andesitic to rhyolitic lava flows and ignimbrites of the Labine Group. Smaller areas are underlain by volcaniclastics and the intrusive Mulligan Porphyry, and the southwest corner of the property is underlain by granodiorite of the Hogarth Pluton (Hoffman, 1978).

A fault forms splays that diverge southwesterly through the claims to converge with a zone of sub-parallel northeasterly striking faults in the western part of the property. From 1977 to 1979, several small uranium-copper showings and numerous radioactive occurrences were found on the property (Fig. 7-6). They are found at or close to northeasterly trending photo-indicated lineaments or faults.

CURRENT WORK AND RESULTS

During 1982, Grid No. 2 (Fig. 7-7) was laid out and explored by geological mapping and a radiometric survey. The grid was designed to cover two northeasterly trending faults that cut rhyolite flows and volcaniclastic conglomerate north of the previously trenched Rhyolite Showing.

New showings of uranium and copper minerals were found on the northern and southern margins of Grid No. 2. Four radioactive occurrences with no visible uranium minerals were also found.

AMUNDSEN BASIN - WOPMAY OROGEN

That part of the Amundsen Basin with which this report is concerned lies to the north of Great Bear Lake and is underlain by Helikian strata of the Hornby Bay and Dismal Lakes Groups (Fig. 7-1). The Hornby Bay Group comprises mainly fluvial to deltaic deposits, whereas the Dismal Lakes Group is composed mainly of marine carbonates and supratidal to tidal siliclastics.

Inliers of Aphebian granitoids and volcanics of the Wopmay Orogen are locally exposed and flanked by rocks of the Dismal Lakes or Hornby Bay Groups. The Aphebian-Helikian unconformity has been intensively explored for uranium, as has the area underlain by the basal unit of the Dismal Lakes Group, which hosts the Mountain Lake uranium deposit. Stratigraphy, tectonics and depositional history of the Hornby Bay and Dismal Lakes Groups have been described by Kerans and others (1981).

HORNBY BAY PROJECT (SOUTH)

PAT CLAIMS	Uranium
B. P. Canada Inc.	86 J/12
Selco Mining & Minerals Division	60°40'N, 115°50'W
1700 - 55 University Ave.	
Toronto, Ont., M5J 2H7	

REFERENCES

Caine and others (1981); Easton (1980, 1981); Hoffman (1980a); Hoffman and St-Onge (1981); Hoffman and others (1978, 1980, 1981); Kerans and others (1981); Seaton (1981, 1983a,b, 1984); Seaton and Hurdle (1978); St-Onge and Hoffman (1980).

DIAND assessment reports 081594, 081063.

PROPERTY

PAT 7, 9-14.

LOCATION

The property (Figs. 7-8, 7-9, 7-10) is centered 475 km north-northwesterly of Yellowknife.

HISTORY

The property was staked by B.P. Minerals in 1976. The exploration history of the claims and adjacent properties was summarized by Seaton (1981, 1983a,b, 1984) and by Seaton and Hurdle (1978). DIAND assessment report 080924 (listed by Caine and others, 1981) records geological and geochemical surveys of the property performed in 1978. An airborne Input EM and magnetometer survey flown in 1979 covered the whole project area west of Speers and McGregor Lakes (DIAND assessment report 081063).

DESCRIPTION

Figure 7-8 shows the regional geology at 1:1,000,000. NTS sheet 86 J has been remapped by Hoffman and others (1978, 1981). Kerans and others

(1981) mapped the Helikian Hornby Bay Group and Dismal Lake Group sediments and described their stratigraphy, sedimentation and tectonism. An outlier of these Hornby Bay Group sediments underlies part of the property. Various structural, stratigraphic and geochemical aspects of the rocks of the Wopmay Orogen pertinent to the property and its surrounding area are discussed in Easton (1980, 1981), Hoffman (1980a), Hoffman and St-Onge (1981), Hoffman and others (1980) and St-Onge and Hoffman (1980).

CURRENT WORK AND RESULTS

In 1982 a 45 line-km grid (the Bluto South Grid) was established to investigate a uranium-copper lake-sediment anomaly found in 1980 at what is informally called Anomaly Lake (Fig. 7-9). The grid was geologically mapped. Hornby Bay Group sediments, sparsely outcropping, were found on the eastern shore of Anomaly Lake. Elsewhere on the Bluto South Grid bedrock is almost entirely hidden by hummocky moraine. The few outcrops in the area and the topographic characteristics suggest the moraine is underlain by a locally fault-bounded outlier of Hornby Bay Group sediments. Northwest of the Zephyr Fault (referred to by B.P. Minerals' geologists as the Perrault Lake Fault) granodiorite gneiss outcrops abundantly.

The Bluto South Grid was explored by collecting 596 soil samples, which were analysed for uranium, copper, nickel and numerous other elements.

Several uranium anomalies, which for the most part are wholly or in part coincident with various base metal anomalies, form a westerly trending zone crossing the grid from the south end of Anomaly Lake to the Zephyr Fault at the grid's northwestern margin.

The property was explored by radiometric prospecting.

Additional uranium showings were not found on the Bluto South Grid or elsewhere on the property during radiometric prospecting in 1982.

HORNBY BAY PROJECT (NORTH)

B. P. Canada Inc.	Uranium
Selco Mining & Minerals Div.	$66^{o}45$'N to $66^{o}58$'N
1700 - 55 University Ave.	$115^{o}27$'W to $116^{o}00$'W
Toronto, Ont., M5J 2H7	

REFERENCES

Hoffman and St-Onge (1981); Hoffman and others (1978, 1981); Kerans and others (1981); McGlynn (1977); Seaton (1981, 1983a,b, 1984); Seaton and Hurdle (1978).

DIAND assessment reports 081648, 081063.

PROPERTY

U 20-22, 26, 29, 31, 35, 43, 48, 54; C 17.

LOCATION

The claims are 485 km to 505 km north-northwesterly of Yellowknife and are but a few of a much larger number of Hornby Bay Project claims (Figs. 7-8, 7-10). Details on individual claims and groups of claims (within the larger Hornby Bay Project claim block) on which work was done in 1982 are listed below:

CLAIMS	NTS	LAT. N.	LONG. W.	REMARKS
U 43	86 J/13	$66^{o}45.0$'	$115^{o}43$'	Five km south of Coppermine River.
U 48, 54	86 J/13	$66^{o}49.5$'	$115^{o}55$'	U 48 straddles Coppermine River.
U 20, 21	86 J/13	$66^{o}53$'	$115^{o}52$'	Three km north of Contact Lake, where 17 holes were drilled in 1980.
U 22, 26, 29, 31.	86 J/13	$66^{o}52.5$'	$115^{o}40$'	From 2 km to 8 km northeast of Coppermine River.
C 17, U 35	86 J/13,14	$66^{o}48$'	$115^{o}30$'	Four km northeast of Coppermine River.

Note that the Hornby Bay Project includes the PAT claims on 86 J/12 (pgs. 266-267 of this report) and previously included the Bear Valley Project claims on 86 J/13, 14 and 86 O/3 (pg.273-282 of this report) as well as the EAST claims on 86 J/10, 11.

HISTORY

The claims were recorded by Union Carbide of Canada Ltd., a joint venture partner on the Hornby Bay Project; the U claims in April, 1979 and the C 17 in October, 1979.

The history of exploration of the Hornby Bay Project claims, and of exploration prior to staking has been reviewed by Seaton (1981, 1983a,b, 1984). A 1979 airborne Input EM and magnetometer survey (DIAND assessment report 081063) covered the entire Hornby Bay Project area (Fig. 7-10).

DESCRIPTION

The regional geology is shown in Figure 7-8. Hoffman and others (1978, 1981) have remapped the area since the publication of McGlynn's (1977) compilation on which Figure 7-8 is based. Kerans and others (1981) have mapped and described the Helikian Hornby Bay Group sediments underlying parts of NTS sheets 86 J, K, L, M, N and O.

Additional references for the Hornby Bay Project dealing with specific aspects of the regional

LEGEND

GEOLOGY

HADRYNIAN

Symbol	Description
Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions.
	RAE GROUP
$_{R}\mathrm{Hssp}^{1}$	Sandstone, siltstone, shale
$_{R}\mathrm{Hs}$	Rae Group undivided

HELIKIAN

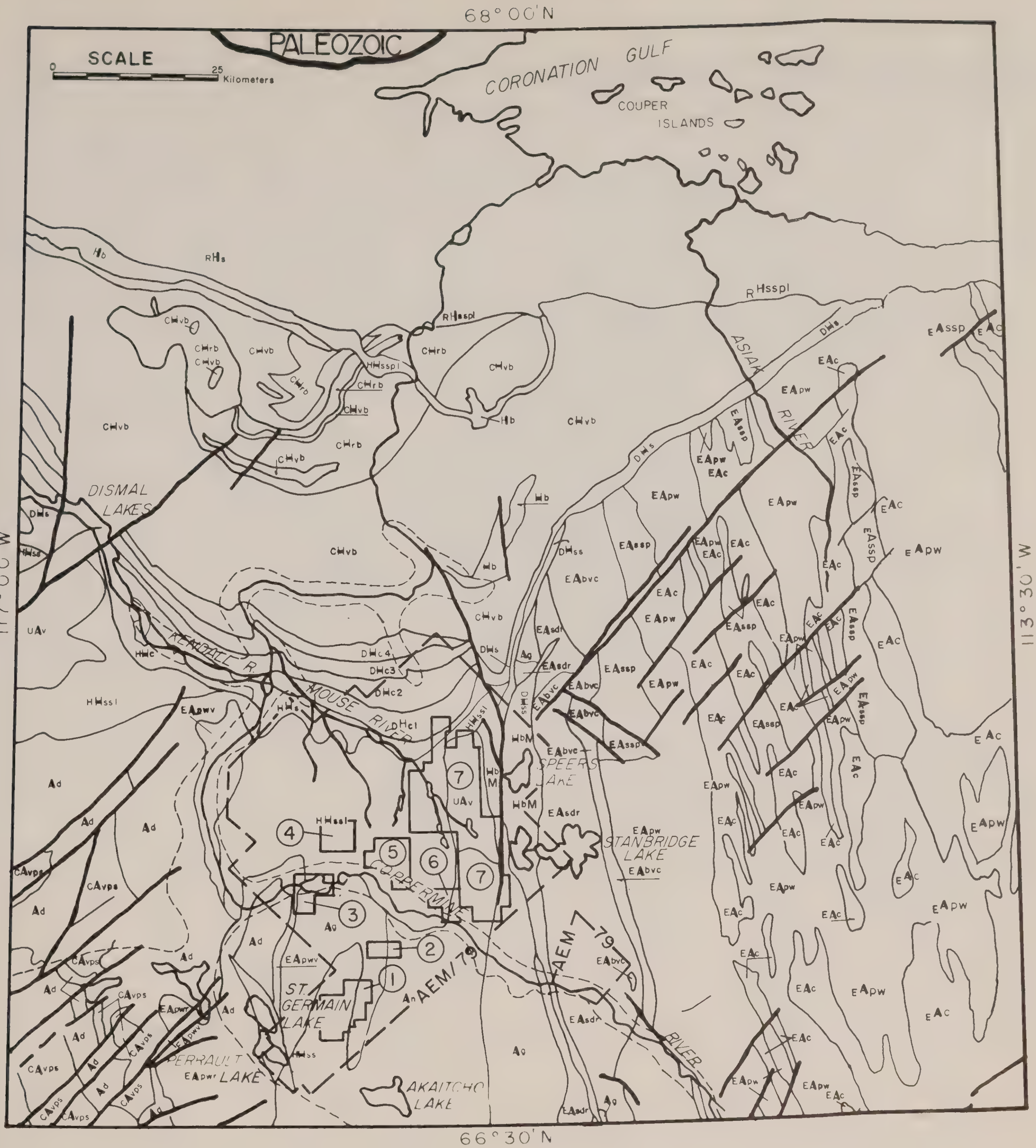
Symbol	Description
	COPPERMINE RIVER GROUP
$_{C}\mathrm{Hb}$	HUSKY CREEK FORMATION: red sandstone and siltstone, intercalated basaltic flows
HbM	Muskox Intrusion
$_{C}\mathrm{Hvb}$	COPPER CREEK FORMATION: basaltic flows, minor sandstone
	DISMAL LAKE GROUP
$_{D}\mathrm{Hc}^{4}$	Laminated dolomite
$_{D}\mathrm{Hc}^{3}$	Massive dolomite
$_{D}\mathrm{Hc}^{2}$	Laminated dolomite
$_{D}\mathrm{Hc}^{1}$	Dolomite, red mudstone
$_{D}\mathrm{Hss}$	Sandstone, black shale
$_{D}\mathrm{Hs}$	Dismal Lake Group undivided
Hb	Muskox Intrusion and gabbro sills and dykes
	HORNBY BAY GROUP
$_{H}\mathrm{Hss}^{2}$	Sandstone, minor conglomerate
$_{H}\mathrm{Hssp}$	Sandstone, siltstone, shale
$_{H}\mathrm{Hc}$	Dolomite
$_{H}\mathrm{Hss}^{1}$	Sandstone, minor conglomerate
$_{H}\mathrm{Hs}$	Hornby Bay Group undivided

APHEBIAN

Symbol	Description
	GREAT BEAR BATHOLITH
Ad	Granodiorite, quartz monzonite, granite
$_{E}\mathrm{Apwv}$	Eastern sequence: greywacke mudstone turbidites, quartzite, shale, arkose, ash flow tuffs, basalts
$_{C}\mathrm{Avps}$	Central sequence: intermediate to acidic ash flow tuffs, air fall tuffs with minor interbedded volcanogenic sedimentary rocks
$_{U}\mathrm{Av}$	Volcanic flows and tuffs, sedimentary rocks, felsite intrusions undivided
	HEPBURN METAMORPHIC-PLUTONIC BELT
Ag	Granodiorite, quartz monzonite, granite
An	Migmatite, veined gneiss, granitic gneiss, includes undifferentiated metamorphosed Snare or Epworth rocks
	EPWORTH GROUP
$_{E}\mathrm{Asdr}$	Metamorphosed Epworth rocks
$_{E}\mathrm{Apw}$	RECLUSE FORMATION: argillite, shale. greywacke turbidites
$_{E}\mathrm{Ac}$	ROCKNEST FORMATION: dolomite
$_{E}\mathrm{Assp}$	ODJICK FORMATION: sandstone, shale, mudstone
$_{E}\mathrm{Abvc}$	Basalts, dolomite

PROPERTIES

1. PAT 7, 9-14 claims
2. U 43
3. U 48, 54
4. U 20, 21
5. U 22, 26, 29, 31
6. C 17, U 35
7. Bear Valley Project



AEM/79 Outline of areas surveyed by Questor Input and airborne magnetometer surveys in 1979

FIGURE 7-8: Asiak and Coppermine Rivers, Coronation Gulf and Dismal Lakes (east). Geology from McGlynn, (1977)

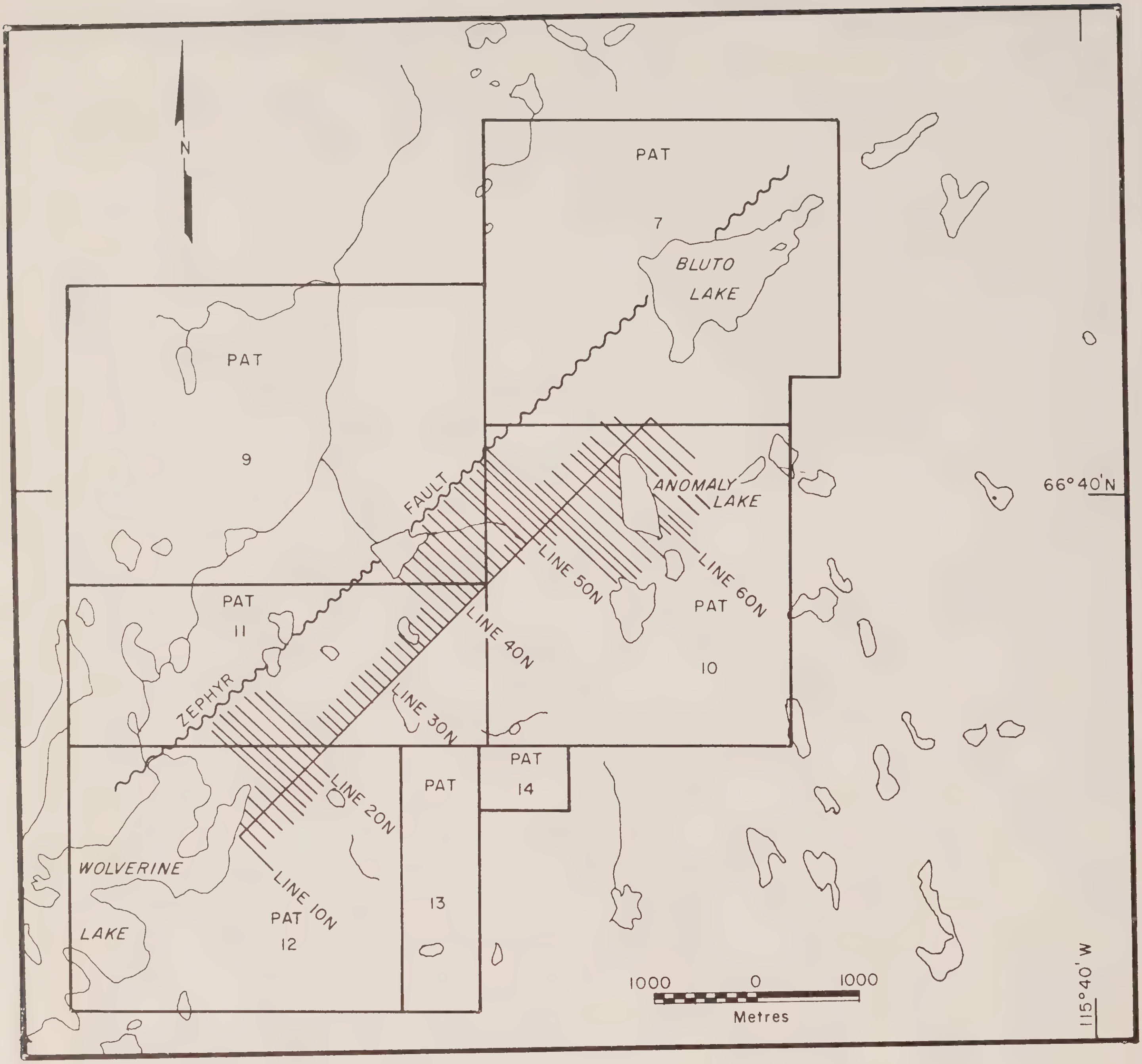


FIGURE 7-9: PAT 7 and PAT 9-14 claims. Grid layout.

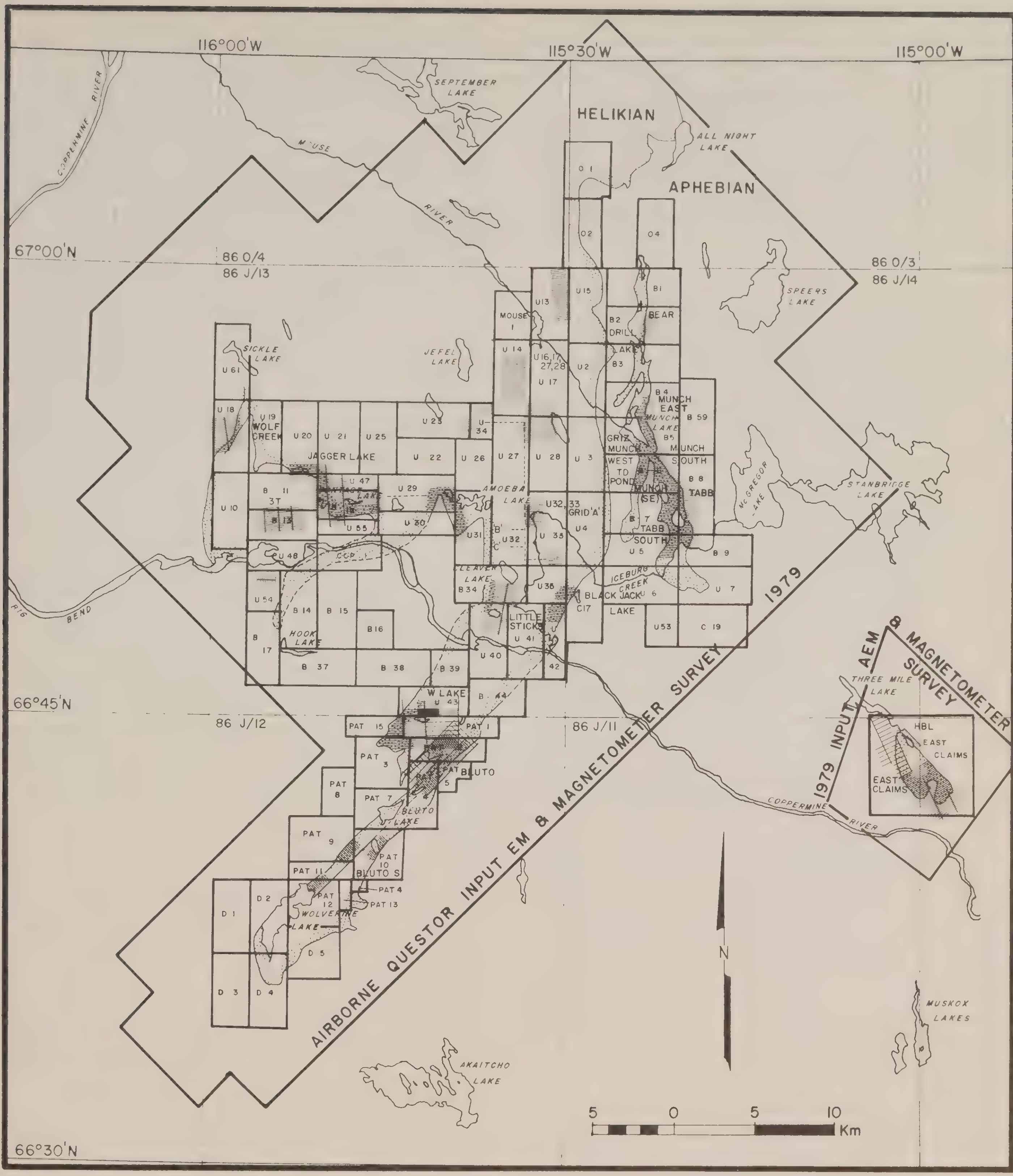


FIGURE 7-10: Hornby Bay Project, claims, grids, unofficial locality names and other data. Areas of property underlain by Hornby Bay Group sediments are in part stippled to show trace of Aphebian-Helikian unconformity.

geology are referred to under Hornby Bay Project - PAT claims (p. 266 of this report).

A zone of Input EM conductors in Akaitcho Group rocks (Hoffman and others, 1981) can be traced south-southwesterly from west and north of Contact Lake across U 48 on the Coppermine River and the U 54 claim, and thence southward onto claim B 17, which adjoins and lies south of U 54. In the Contact Lake area these conductors are known to be caused by graphite.

CURRENT WORK AND RESULTS

U 43 CLAIM

In 1982 a 13.1 line-km grid (the W Lake Grid) in the south-central part of claim U-43 (Fig. 7-10) was explored by geological mapping and soil sampling.

Geological mapping showed the central part of the grid to be mainly underlain by quartz adamellite gneiss, of possible Archean age, interlayered sparsely with amphibolite. This map unit is in contact in the northwestern quarter of the grid with an amphibolite unit, that contains minor amounts of hornblende-quartz-biotite schist. The quartz adamellite and amphibolite units together are flanked to the northwest and southwest, and to the south on claim PAT 1 by Hornby Bay Group paleotalus conglomerate and lithic arkosic sandstone. To the northeast the adamellite and amphibolite outcrops are flanked by till, which according to B.P. Minerals interpretation (based on the recessive nature of the till covered area and sparse outcrops beyond the gridded area), is probably underlain by Hornby Bay Group sediments.

The Hawk Showing consists of pitchblende hosted by rocks of the adamellite gneiss unit about 20 m southeast of the contact between this unit and the amphibolite unit. The Storm Showing consists of radioactive boulders roughly 670 m southwesterly of the Hawk Showing. The three radioactive erratics of the Storm Showing include one which contained pitchblende-bearing veinlets and from which a sample that assayed 3% uranium was obtained.

One hundred and twenty two soil samples were collected at 100 m intervals along lines 100 m apart. The samples were analysed for uranium, copper, lead, zinc, nickel and numerous other elements. The pH of all samples and background radioactivity at each sampling site was determined.

The soil sampling delineated several uranium and uranium-base metal anomalies near the Storm Showing. Uranium, base metal and lithophile element anomalies, both discrete and coincident were found along a north-northwesterly trending lineament crossing adamellite gneiss and amphibolite about 100 m east of the Hawk Showing.

U 48, 54 CLAIMS

A 14 line-km grid (the Coppermine River Grid) in the northern and northeastern part of U 54 was explored in 1982 by geological mapping and by the collection of 139 soil samples at 100-m intervals.

Geological mapping showed that outcrops are found only in the southern part of the grid. These are of dolomite or marble and biotite-amphibole-quartz schist, which occur as alternating north-northeasterly trending units. Graphite was not found - in contrast to the Contact Lake area - although three of the Input EM conductors cross the grid. Scarcity of outcrop may be the reason the conductors were not traced to graphite. Air photos suggest that claim U 48 is probably entirely covered by Pleistocene glacial deposits.

Soil samples were collected and analysed for uranium, copper, lead, zinc, nickel and numerous other elements and the pH of samples determined.Three uranium anomalies were outlined and are coincident with anomalous base metal concentrations. One uranium anomaly is in a bog near outcrops of biotite-amphibole-quartz schist and two, which are in till covered areas, are close to Input EM conductors. Besides uranium anomalies a few discrete base metal anomalies were delineated.

U 20, 21 CLAIMS

A 21.8 line-km grid, in the south of claim U 20 and southwest part of U 21 and which adjoins and lies north of the Contact Lake Grid, was explored in 1982 by the collection of 219 soil samples. The samples were collected at 100-m intervals along lines 100 m apart, and analysed for uranium, copper, lead, zinc, nickel and numerous other elements. The pH of all samples was determined.

A uranium anomaly with coincident base metal anomalies that trends north-northwesterly parallel to regional faults mapped south of Jagger Lake was outlined.

U 22, 26, 29, 31 CLAIMS

In 1982, a 46.9 line-km grid, the Amoeba Lake

Grid (Fig. 7-10) was explored by collecting 490 soil samples at 100-m intervals along lines 100 m apart and in part by geological mapping. Soil sampling and mapping were designed to investigate a copper lake-sediment anomaly discovered in 1976 in a lake informally called Shrimp Lake which is situated about 800 m east of the north-northeasterly trending Monocline Fault. Soil samples were analysed for uranium, copper, lead, zinc, nickel and numerous other elements. The pH of all samples was determined.

Anomalous concentrations of uranium and other metals were outlined mainly in the southeastern part of claim U 29, southwesterly of Shrimp Lake and mainly east of the Monocline Fault in an area mainly underlain by granodiorite gneiss and amphibolite.

C 17, U 35 CLAIMS

In 1982 an 18.6 line-km grid, the Blackjack Lake Grid, was established. The 1.19 sq-km grid lies half on claim C 17 and half on claim U 35 (Fig. 7-10).

The grid was explored by geological mapping and by collecting 150 soil samples at 100-m intervals. The samples were analysed for uranium, copper, lead, zinc, nickel and numerous other elements. The pH of each sample was measured.

Mapping showed that felsic tuffs and felsic flows of the Akaitcho Group outcrop in the eastern 30% of the grid. The remaining 70% of the grid is devoid of outcrop, but has been interpreted to be underlain by Hornby Bay Group sandstone under a thin till cover. A northeasterly trending scarp between Blackjack and Falcon's Lake has been interpreted as a fault, along which the Akaitcho Group rocks are in contact with the recessive Hornby Bay Group sandstone. The soil sampling survey outlined a uranium anomaly and coincident multi-element anomaly along the interpreted fault in the northeastern part of the grid.

BEAR VALLEY PROJECT

Anaconda Canada Expl. Ltd.	Uranium
1600, 1500 W. Georgia St.	86 J/13,14; 86 O/3
Vancouver, B.C., V6G 2Z6	$66^{0}50'$N,$115^{0}25'$W

REFERENCES

Easton (1980); Hoffman (1980a); Hoffman and St-Onge (1981); Hoffman and others (1978, 1981); Kerans and others (1981); Seaton (1981, 1983a,b, 1984); Seaton and Hurdle (1978); St-Onge and Hoffman (1980).

DIAND assessment reports 081701, 081730.

PROPERTY

B 1-9, C 19, MOUSE 1, O 1-4, U 1, 2, 5-7, 15-17, 53, 59.

LOCATION

The property is at Munch Lake (Figs. 7-8, 7-10 to 7-15), an informal name which, like many others used to describe lakes, grids and showings on the property, reflects the disagreeable interaction of grizzly bears and geologists. Munch Lake is 505 km north-northwesterly of Yellowknife. Figures 7-11 to 7-15 show individual claim locations.

HISTORY

B.P. Minerals Ltd. recorded O 1-4 in April of 1978 and the MOUSE 1 claim in May of 1981. The B, C and U claims were recorded by Union Carbide of Canada Ltd., a joint venture partner of B.P. Minerals, as part of the Hornby Bay Project block of claims. The B, C and U claims were recorded in April of 1979, except for the C 17 and U 59 claims, which were recorded in October of 1979.

The history of exploration to 1981, both prior and subsequent to staking, has been reviewed by Seaton (1981, 1983a,b, 1984) and by Seaton and Hurdle (1978). Figure 7-11 shows grids established by B.P. Minerals and areas drilled from 1978 to 1980.

In 1982, Anaconda Canada Exploration joined B.P. and Union Carbide to become operator in a new joint venture for the Bear Valley portion of the Hornby Bay Project.

DESCRIPTION

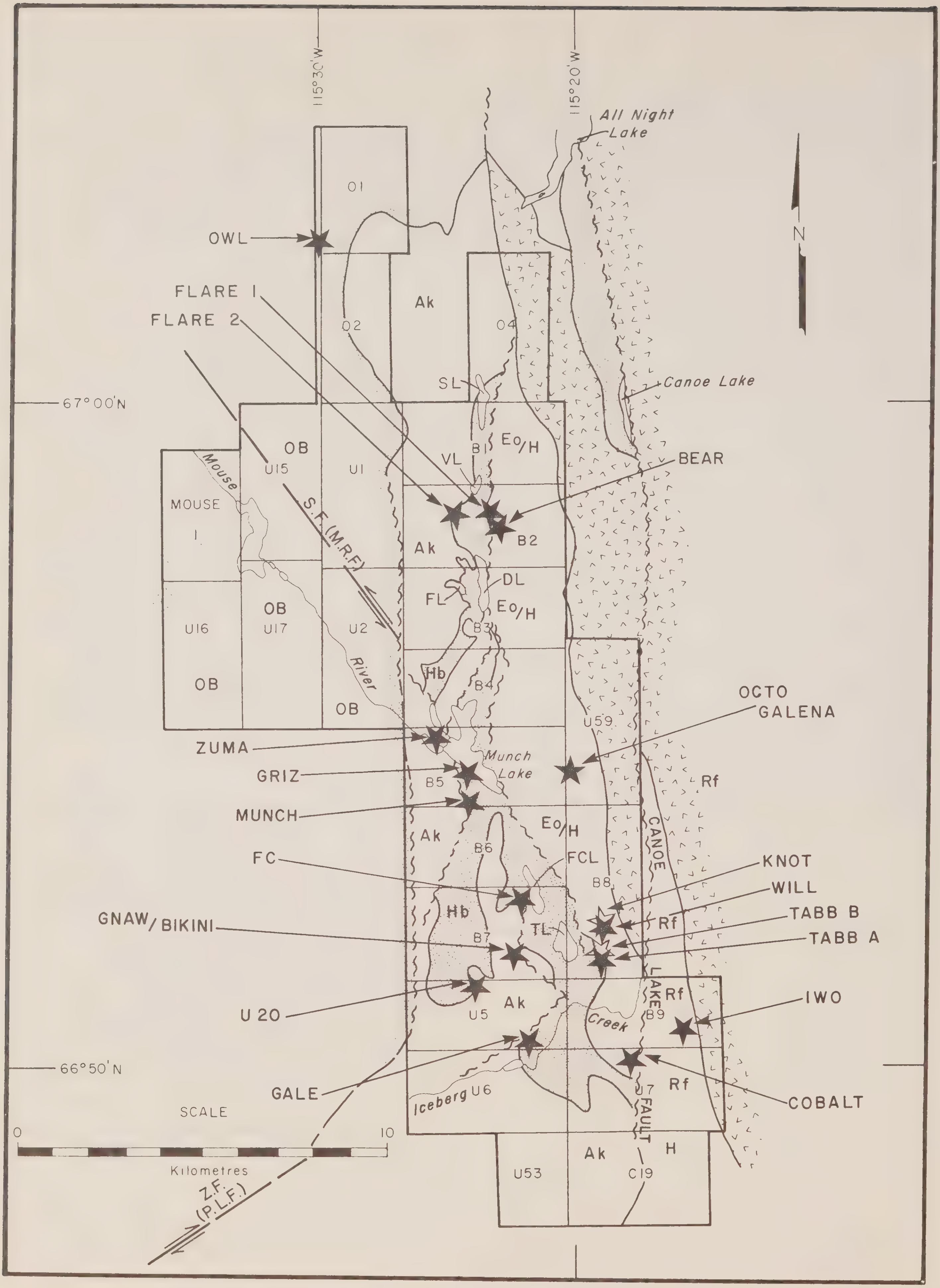
The regional geology is shown in Figure 7-10. The area has been remapped by Hoffman and others (1978, 1981). Kerans and others (1981) have mapped and described the Helikian Hornby Bay Group sediments underlying parts of NTS sheets 86 J, K, L, M, N and O.

The geology of the project area was briefly reviewed by Seaton (1984). Specific aspects of the geology were covered by Easton (1980), Hoffman (1980a), Hoffman and St-Onge (1981), Hoffman and others (1980), and St-Onge and Hoffman (1980).

Figure 7-12 shows the locations of the main showings and the general geology of the Bear Valley Project area. The figure is derived mainly from Anaconda's mapping. The geology is considerably simplified and locally modified after Hoffman and others (1981).

CURRENT WORK AND RESULTS

Current work and results are summarised in Tables 7-2, 7-3 and 7-4 and in Figures 7-13, 7-14 and 7-15.


115°30'W
115°20'W
All Night
Lake
N
O1
OWL
FLARE 1
FLARE 2
Ak
O2
O4
SL
Canoe Lake
67°00'N
OB
U15
U1
B1
Eo/H
VL
BEAR
Mouse
MOUSE
1
S.F. (M.R.F.)
Ak
B2
DL
FL
Eo/H
OB
U16
U17
U2
B3
Hb
B4
River
OB
OB
OCTO
GALENA
U59
ZUMA
Munch
Lake
GRIZ
B5
Rf
MUNCH
Ak
Eo/H
B6
CANOE
FC
FCL
KNOT
B8
WILL
TABB B
Hb
GNAW/BIKINI
TL
Rf
TABB A
B7
U 20
Ak
LAKE
Rf
IWO
U5
Creek
B9
GALE
COBALT
66°50'N
Iceberg
U6
U7
Rf
SCALE
FAULT
0
10
Ak
H
Kilometres
U53
C19
Z.F.
(P.L.F.)

LEGEND

OB	Areas largely covered by surficial deposits
	Muskox Intrusion
Hb	Hornby Bay Group
H	Hepburn Batholith, intrusive complex
	CORONATION SUPERGROUP
Rf	Recluse Group. Fontano Formation
Eo	Epworth Group. Odjick Formation
Ak	Akaitcho Group

KEY TO LAKES
(Un-official names)

SL	Sno Lake
VL	Valley Lake
DL	Drill Lake
FL	Fire Lake
FCL	FC Lake
TL	Tabb Lake

Faults mapped by Anaconda Canada Exploration Ltd. geologists on Bear Valley Project property.

Transcurrent faults of regional extent

Z.F. Zephyr Fault. (P.L.F.) Perrault Lake Fault.
The Zephyr Fault (Hoffman, 1980 a) is referred to by B.P. Minerals Ltd. geologists as the Perrault Lake fault.

S.F. Sinister Fault. (M.F.R.) Mouse River Fault.
The Mouse River Fault of B.P. Minerals geologists is either a splay of or a faulted continuation of the Sinister Fault (Hoffman 1980a).

★ Mineral Showings, with name

FIGURE 7-11: Generalized geology of the Bear Valley Project area and mineral showings.

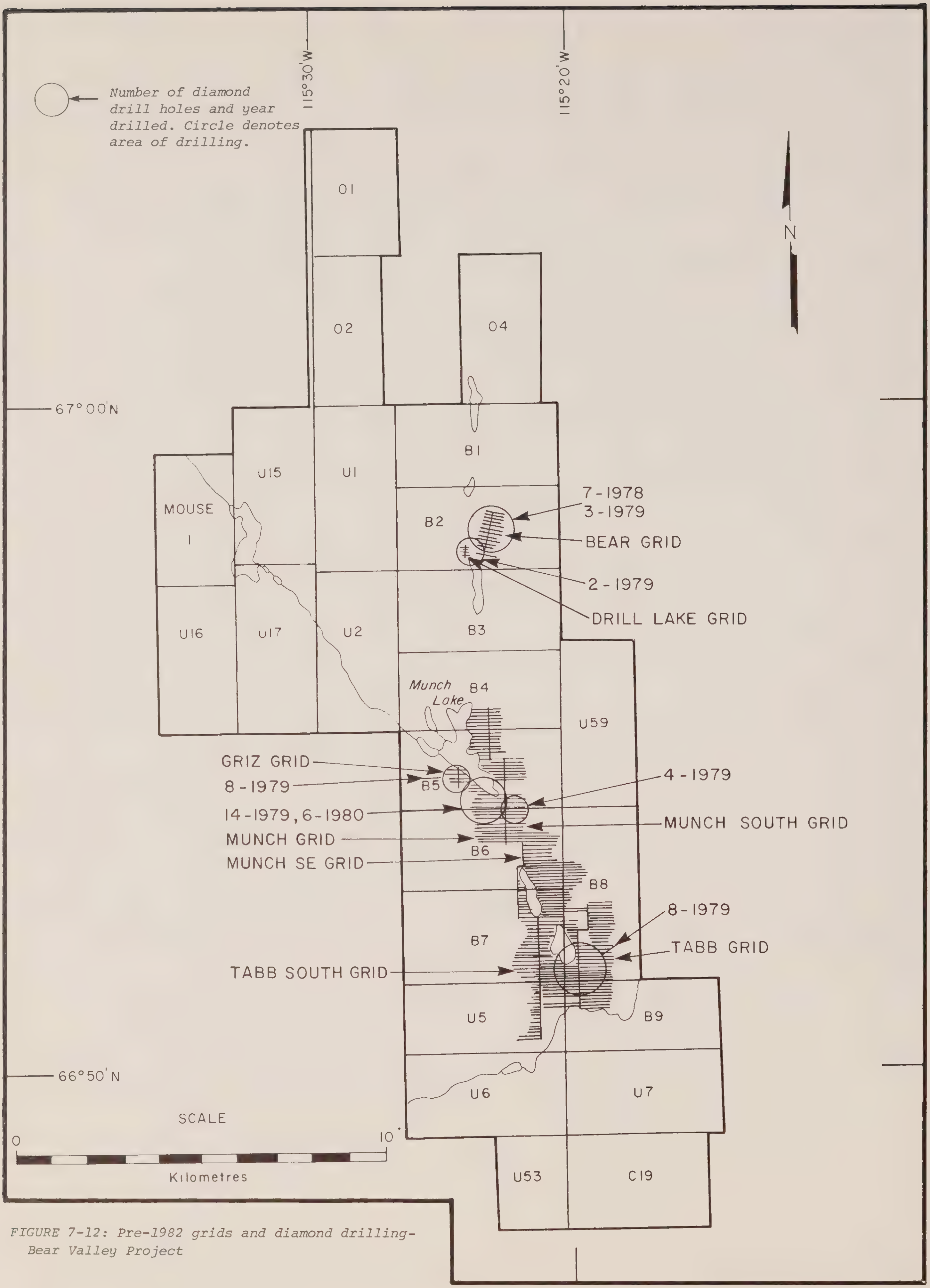


*FIGURE 7-12: Pre-1982 grids and diamond drilling-
Bear Valley Project*

TABLE 7-2: SUMMARY OF 1982 EXPLORATION ACTIVITY BEAR VALLEY, N.W.T.

GRID NAME	Line-cutting (Km)	SHOWINGS: NAME SUBGRID	SHOWINGS: HOST ROCK	SHOWINGS: Mapped in detail	GEOCHEMISTRY: Soils	GEOCHEMISTRY: Surface Lithogeochem: ICP	GEOCHEMISTRY: Surface Lithogeochem: Whole Rock	GEOCHEMISTRY: Surface Lithogeochem: XRD	GEOPHYSICS (KM): VLF-EM	GEOPHYSICS (KM): Mag	GEOPHYSICS (KM): HLEM	GEOPHYSICS (KM): I.P.	GEOPHYSICS (KM): Chaining	OVERBURDEN DRILL: No of holes completed	OVERBURDEN DRILL: Total m. drilled	OVERBURDEN DRILL: No of till Samples	OVERBURDEN DRILL: No of XRD	TRACK ETCH: No. of cups.	XRD ON BP core: No. of samples	PETROGRAPHY: No of Thin sections
TABB	62.2				113	21	6		5.4					25	96.8	72		395		44
		Tabb	Hepburn	✓		5	3													25
		Will	Hepburn	✓		11	2													12
		Knot	Epworth	✓		2														2
		Smoke	Akaitcho	✓		3	1													5
GNAW	54.0				1221	47	21	3	12.3	10.5	5.1	2.9	4.8	6	51.5	26		417	5	48
		Gnaw	Akaitcho	✓		15	9		7.6	4.8	5.1	2.9	4.8							21
		F C.	Akaitcho	✓		19	9		4.7	4.7										17
		Gale	Hornby	✓		13	3	3		1.0				6	51.5	26			5	9
		Vug	Akaitcho																	1
MUNCH	31.7				52	17	8	5	7.4	4.8	3.8	1.4	4.8	40	262.8	135		236	230	17
		Munch	Hornby			16	7	5											196	10
		Griz	Hornby			1	1												34	7
BEAR	9.8				51	2			2.8	7.0	3.5		4.1	2	21	13		199	4	12
		Bear	Hepburn											2	21	13			4	6
		N Bear	Hepburn							4.1	3.5		4.1							
		S. Bear	Hornby						2.8	2.9										
		Flare I	Akaitcho			1														2
		Flare II	Hornby			1														4
COBALT	17.6				249	14	13		17.2	16.9										23
		Cobalt	Hepburn	✓		12	12													19
		Pipe	Hepburn			2	1													4
OWL	32.7				653	8														6
		N.Owl	Hornby	✓		3														3
		S.Owl	Hornby	✓		5														3
C-19	23				502				20.9	20.8										
MOUSE	28.4								25.8	25.2										
SNOW	4.6								3.3	3.0	2.6		3.9							
NO GRID																				
		Two	Epworth			1														3
		U 20	Akaitcho	✓		2														5
		Zuma	Akaitcho			2														3
		Octo Pb	Epworth			3														3
		Iceburg Pb	Epworth			1														
LOCAL						2														19
REGIONAL						2	9													18
TOTAL					3841	122	57	8	95.1	88.2	15	4.3	17.6	73	432.1	246		1247	239	201

TABLE 7-3: SUMMARY OF 1983 EXPLORATION ACTIVITY BEAR VALLEY, N.W.T.

GRID NAME	Line-cutting (Km)	SHOWINGS: NAME SUBGRID	SHOWINGS: HOST ROCK	SHOWINGS: Mapped in detail	GEOCHEMISTRY: Soils	GEOCHEMISTRY: Surface Lithogeochem: ICP	GEOCHEMISTRY: Surface Lithogeochem: WHOLE ROCK	GEOCHEMISTRY: Surface Lithogeochem: XRD	GEOPHYSICS (KM): VLF-EM	GEOPHYSICS (KM): Mag	GEOPHYSICS (KM): HLEM	GEOPHYSICS (KM): EM-16R	GEOPHYSICS (KM): Chaining/slope Correcting	DIAMOND DRILLING: No of holes completed	DIAMOND DRILLING: Total m. drilled	DIAMOND DRILLING: No of Assays	DIAMOND DRILLING: No of XRD	TRACK ETCH: No. of cups recovered	XRD ON BP core: No. of samples	PETROGRAPHY: No of Thin sections	RADON TUBES: No replaced
TABB									9.47	12.00		13.09	13.02	9	736	43		351			
		Tabb	Hepburn						9.47	12.00		8.12	13.02	2	233	3					
		Will	Hepburn									4.85		1	73	0					
		Knot	Epworth											5	369	31					
		Smoke	Akaitcho											1	64	9					
GNAW									7.05	19.95	0.09	21.92	3.30	20	1321	36		365			146
		Gnaw	Akaitcho						4.15	10.80		8.90	2.40	11	719	33		195			119
		F C	Akaitcho						2.90	9.15	0.90	13.02	0.90	9	602	3		126			37
		Gale	Hornby															44			
		Vug	Akaitcho																		
MUNCH									6.65	10.00		10.39	0.97	3	330	2		218			101
		Munch	Hornby						6.65	10.00		8.27		3	330	2					35
			Hornby									2.12									66
BEAR									7.75	9.50		10.37	9.50	12	1084	60		103			227
		Bear	Hepburn						7.25	9.50		8.60		5	416	27		103			227
		N Bear	Hepburn						0.50			1.77									
		S. Bear	Hornby																		
		Flare I	Akaitcho																		
		Flare II	Hornby											7	632	33					
COBALT									9.00					2	92	4					
		Cobalt	Hepburn																		
		Pipe	Hepburn																		
OWL									5.22	15.65											
		N Owl	Hornby																		
		S.Owl	Hornby																		
C-19																					
MOUSE										21.00											
SNOW									4.88	4.88	3.30		3.30								
NO GRID																					
		Two	Epworth																		
		U 20	Akaitcho																		
		Zuma	Akaitcho																		
		Octo Pb	Epworth																		
		Iceburg Pb	Epworth																		
LOCAL																					
REGIONAL																					
TOTAL									50.02		4.20	55.77	30.09	46	3566			1037			474

TABLE 7-4 BEAR VALLEY PROJECT. SUMMARY OF 1983 DIAMOND DRILLING.

Hole No.	Depth (m)	Grid	Showing	Target Anomalies/Geological Features
83-1	80.00	Bear	Bear	R./Low, VLF., Bear sh.z. Nearby soils (U.Po.^{210}).
83-2	94.10	Bear	Bear	R./Low, VLF.EM.(MM.)Rad.(Scint.Tr.E.PT.)Soils(U.Po^{210})
83-3	73.00	Bear	Bear	Rad.(scint.)Soils(U.Po210).
83-4	80.00	Bear	Bear	R./Low,VLF.EM.(MM.)Rad.(PT.).
83-5	70.50	Bear	Flare 2	Adjacent to trench on Flare 2 Showing.
83-6	106.00	Bear	Flare 2	Rad.(scint.)anomaly(extension along strike).
83-7	99.95	Bear	Flare 2	R./Low.Rad.
83-8	89.07	Bear	Bear	VLF.EM.(MM.)Rad.(PT.).
83-9	56.00	Bear	Flare 2	Local northerly linear.Drilled towards Rad.(scint.).
83-10	100.00	Munch	Munch	VLF.Rad.(Tr.E.)Soils U.
83-11	150.00	Munch	Munch	Bs.Till(U.)Rad.(Tr.E.)alt.(chloritic).
83-12	80.00	Munch	Munch	R.Low.VLF.Rad.(Tr.E.)Nearby Soils(U.)& alt.(chloritic)
83-13	68.00	Gnaw	Bikini	Showing ext.Soils(U.)Geol.contact inferred from R/data
83-14	54.53	Gnaw	Bikini	Showing ext.Soils(U.)Geol.contact inferred from R/data
83-15	85.15	Gnaw	Bikini	Showing ext.Soils(U.)Geol.contact inferred from R/data
83-16	50.00	Gnaw	Bikini	Rad. drilled to find source.
83-17	44.00	Gnaw	Gnaw	Rad.(Scint.)Soils(U.).
83-18	45.00	Gnaw	Gnaw	VLF.R/Low.Soils(U.).
83-19	99.00	Gnaw	Bikini	VLF.Rad.(Tr.E.)Soils(U.).
83-20	108.00	Gnaw	Bikini	VLF.Soils(U.) 400 m. N.E. of Bikini Showing.
83-21	35.00	Gnaw	Bikini	Showing ext. Soils (U.) nearby.
83-22	70.00	Gnaw	Bikini	Showing ext. Soils (U.) nearby. Suspected NNE. fr.z.
83-23	60.23	Gnaw	Bikini	VLF. Soils (U.).
83-24	84.78	FC	FC	R./Low. VLF.
83-25	80.00	FC	FC	EM(MM.).
83-26	70.00	FC	FC	Soils U.
83-27	50.00	FC	FC	Rad.(Scint.)Radioactive joints.Rad (Tr.E.).
83-28	45.00	FC	FC	Rad.(Scint.)Adj. Rad.(Tr.E.)and R./Low.
83-29	60.00	FC	FC	Rad.(Scint.).
83-30	102.56	FC	FC	Rad. (Tr.E.) Lk. Seds. (U.).
83-31	50.00	FC	FC	Rad. (Tr.E.) LK. Seds. (U.).
83-32	60.00	FC	FC	Rad. (Tr.E.,Alph.).
83-33	63.95	Tabb	Tabb B	Rad.(Scint.).
83-34	75.50	Tabb	Tabb B	Rad.B.Tr.
83-35	40.00	Tabb	Tabb B	Ext.of radioactive sh.z cut in hole 83-34.
83-36	126.00	Tabb	Tabb B	Radioactive joints near graphitic shear.
83-37	73.00	Tabb	Tabb A	Showing ext.
83-40	107.00	Tabb	Tabb	Rad(Tr.E.) Inferred fault convergence.
83-41	126.00	Tabb	Tabb	VLF. Rad. (Tr.E.). Regolith.
83-38	32.00	Cobalt	Cobalt	Showing ext.
83-39	60.00	Cobalt	Cobalt	Showing ext. VLF.
83-42	63.50	Tabb	Tabb B	Rad.Graph.sh.with VLF conductor and Surface Rad(Scint)
83-43	63.50	Tabb	Will	Rad.(scint.) Graph. sh. Br.z.
83-44	89.00	Bear	Flare 2	Showing ext. Br.z. extension.
83-45	112.00	Bear	Flare 2	Rad(Scint)coincident with westerly trending structure.
83-46	98.70	Bear	Flare 2	Br.z. South of Flare 2 Br.z. showing.

RESULTS OF DOWN HOLE RADIOMETRIC PROBES

One or more anomalous spot highs were recorded in 24 out of 46 holes. Nine spot highs in 7 holes (3 holes on the Tabb Grid, 2 at the Flare 2 showing, One on the Munch Grid and one on the Gnaw Grid) gave radiometric counts equivalent to concentrations of 0.05% - 0.25% U_3O_8.

Geology, Main bedrock types intersected

Hbss. H.(gr.) Ak.(amph.sch.). 6.5 m. br. z. and fault gouge.
H.(gr.gn.)Ak.(amph.) Mainly qtz.feld.-bio. gneiss 0.3 m. graph.py.z.
H.(gr.gn.) Ak. Mainly qtz.feld.-bio. gneiss.
H.(gr.gn.) Ak. (Locally graphitic) 4.2 m. graph. py.z.
Hbss. Hbcg. (minor). Local alt.(chloritic) in Hbss. 25.3 m. fr.z. with hem.
Hbss. Hbcg. (minor). Local alt.(chloritic) in Hbss. Hbss. locally br.
Hbss.
H. (gr.gn.) Ak. (bio.sch. and carbonate) 0.3 m. graph. py.z.
Hbss. Hbcg. (minor). Local brecciation.
Hbss. Local alt. (chloritic and clay). Br.z. at contact with Ak.
Hbss. Hbcg. Ak. (volcanics) Alt. (Hbss.) local hematite and bleaching.
Hbss. Hbcg. Ak. (volcanics and argillite).
Ak. (arg. qtz.-bio.chlor.sch.).
Ak. (arg. qtz.-bio.chlor.sch.) Sch. locally pyritic.
Ak. arg.locally br. qtz.-bio.chlor.sch.locally br.) Minor calc.-silicate.
Ak. (qtz.-bio.-sch.) 2.5 m. br.z.
Ak. (qtz.-bio.-chlor.sch.).Minor calc.-silicate and dol. 2 - 1 m. br.sch.
Ak. (arg. chlor.-bio.-amph.schist) Three br. zones.
Hbss. Hbcg.Ak.(musc.-chlor.sch.) at end of hole.
Hbss. Hbcg. Ak. (bio.-chlor.sch. calcareous bio-sch.).
Ak. (Sch:bio.-chlor. bio. bio.-qtz.-chlor.)
Ak. (arg;sch:bio.-chlor. qzt.-bio. bio.).
Ak. (bio.-qtz.sch.) Alt.(hem).
Hbss.Minor Hb. mudstone and Hbcg.
Hbss. (minor conglomeratic Hbss.).
Hbss. Hbss.(regolith) Ak.(brecciated felsic-metavolcanics).
Hb? (May be paleotalus of Ak. boulders and frags.) Ak. sch.
Hb (paleotalus).
Hb(minor paleotalus) Ak. (intermed. volc. and sch.).
Hbss. Alt. (hem. bleaching and clay).
Diabase Ak.(intermed. and mafic metavolcanics).
Ak. (felsic metavolcanic).
H.(gr.gn.) Ak. (marble)Serp. 13 m. wide Sh.z. locally graphitic.
H. (gr. including diorite gn.). 0.6 m graph. Sh.z.
H. (gr.gn.) Br. with graph. and graphitic sh. zones.
H. (gr.gn.) minor diabase dykes. Graph.sh.zones and schist.
H. Sh.z.
Hbss. Hbcg. Ak(?) H.(gr.gn.) Hole cuts Bear Shear.
Hbss. Hbcg. H.(gr.) and schist.
H(gr.).
H(gr.).
H.(gr. including diorite) Serp. on Bear Shear.
Graphitic chlorite schist, locally with py. H.(gr. and gr.gn.)
Hbss. Minor Hbcg. and paleotalus. Diabase at end of hole.
Hbss. br. Hbcg. Br.z. has chloritic alt. Hb. paleotalus.
Hbss. with br. zones.

EM CONDUCTORS

In 12 holes, conductors delineated by previous surface surveys were traced to graphite mostly associated with shear or fracture zones. Seven conductors were explained by fractures, brecciation or zones of shearing encountered by drilling.

Geological Legend

Key to Formation

Hbss. Hornby Bay Group sediments (mostly sandstone).
Hbcg. Hornby Bay Group Conglomerate.
H. Hepburn Batholith rocks.
Ak. Akaitcho Group.

Abbreviations

Geophysical Anomaly Type

VLF.-EM...VLF.- electromagnetic

EM.(MM.) Max.-Min. - 11 EM. System

R./Low. Resistivity low from EM.16 R.

R./Resistivity

Radiometric Anomaly Type

Rad.(scint.)Scintillometer
Rad.(Tr.E.) Track Etch
Rad.(PT)Powell radon tube
Rad.(Alph.) Alphameter

Geochemical Anomaly Type

Soils (U),(Po^{210}) Anomaly delineated by soil sampling survey. Anomalously concentrated element bracketted.

Lk. Seds (U) Anomalous concentration of uranium in lake sediments.

Geological

alt. Alteration
amph. Amphibolite
arg. Argillite
bio. Biotite
br. Breccia, brecciated
br.z. Breccia zone
chlor. Chlorite, chloritic
dol. Dolomite
ext. Extension
feld. Feldspar
frag. Fragment
fr.z. Fracture zone
geol. Geological
gn. Gneiss
gr. Granitic
graph. Graphite
hem. Hematite
intermed. Intermediate
musc. Muscovite
py. Pyrite
qtz. Quartz
sch. Schist
sh.z. Shear Zone
volc. Volcanic
serp. Serpentinite

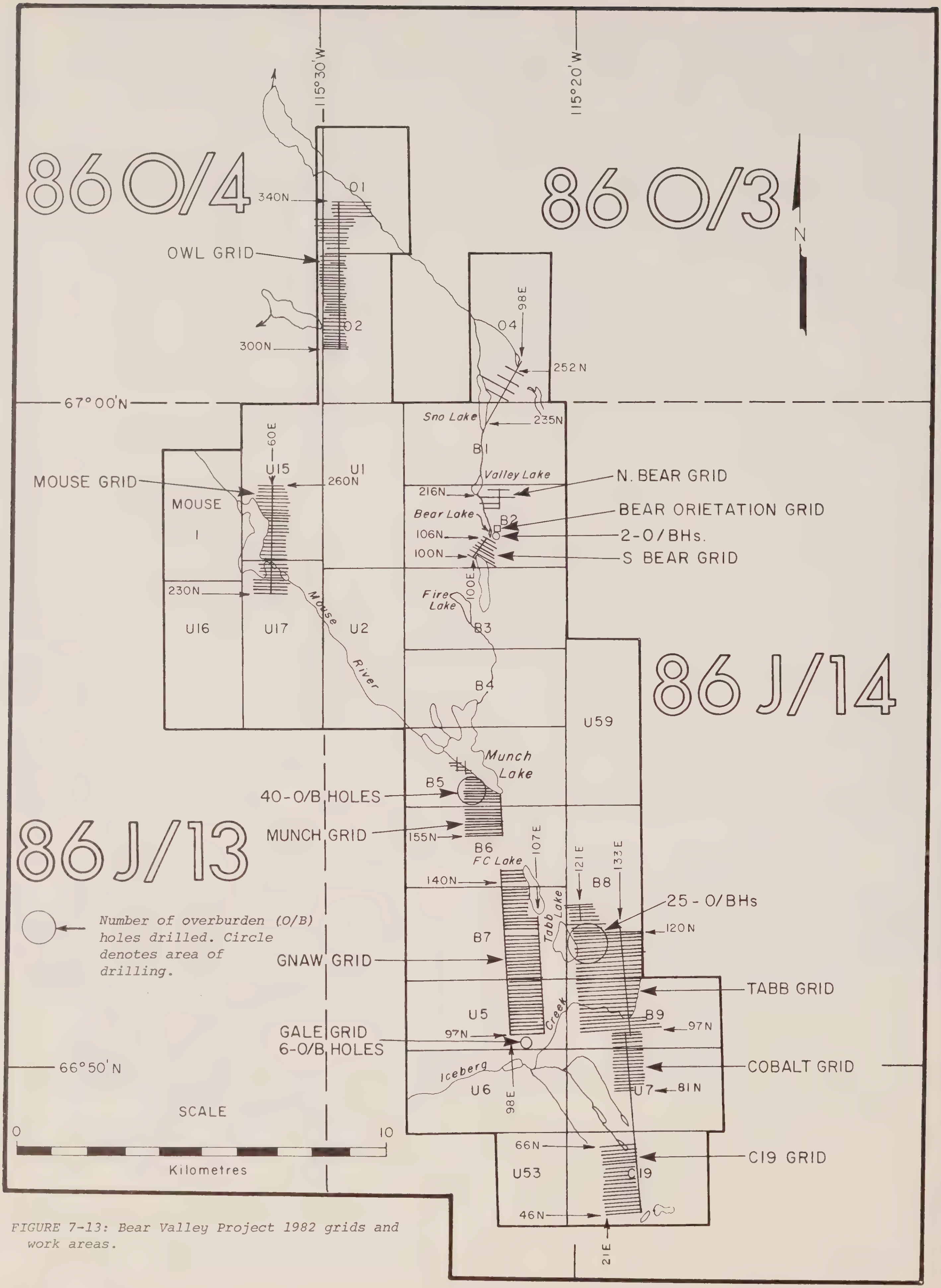


FIGURE 7-13: Bear Valley Project 1982 grids and work areas.

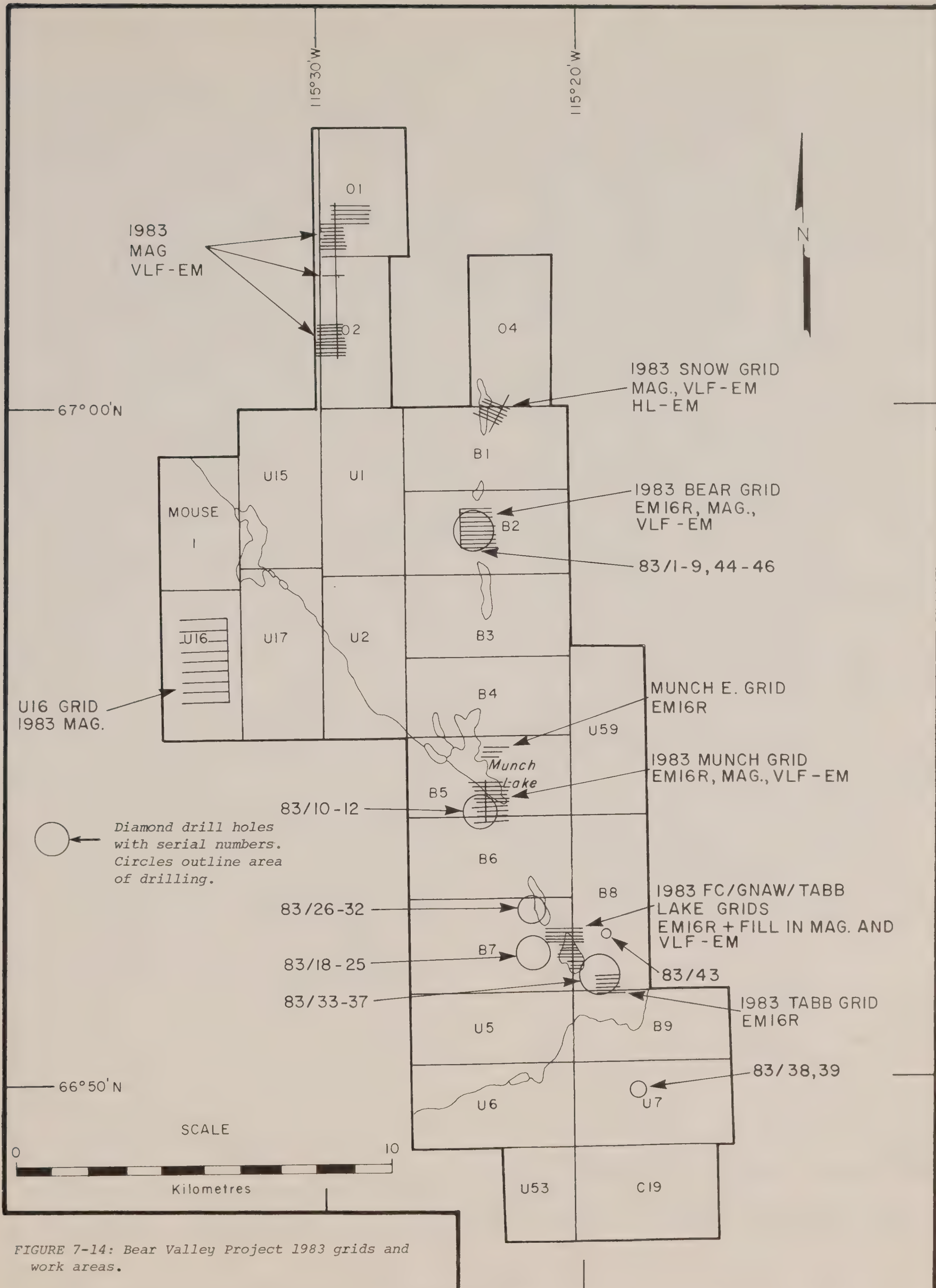


FIGURE 7-14: Bear Valley Project 1983 grids and work areas.

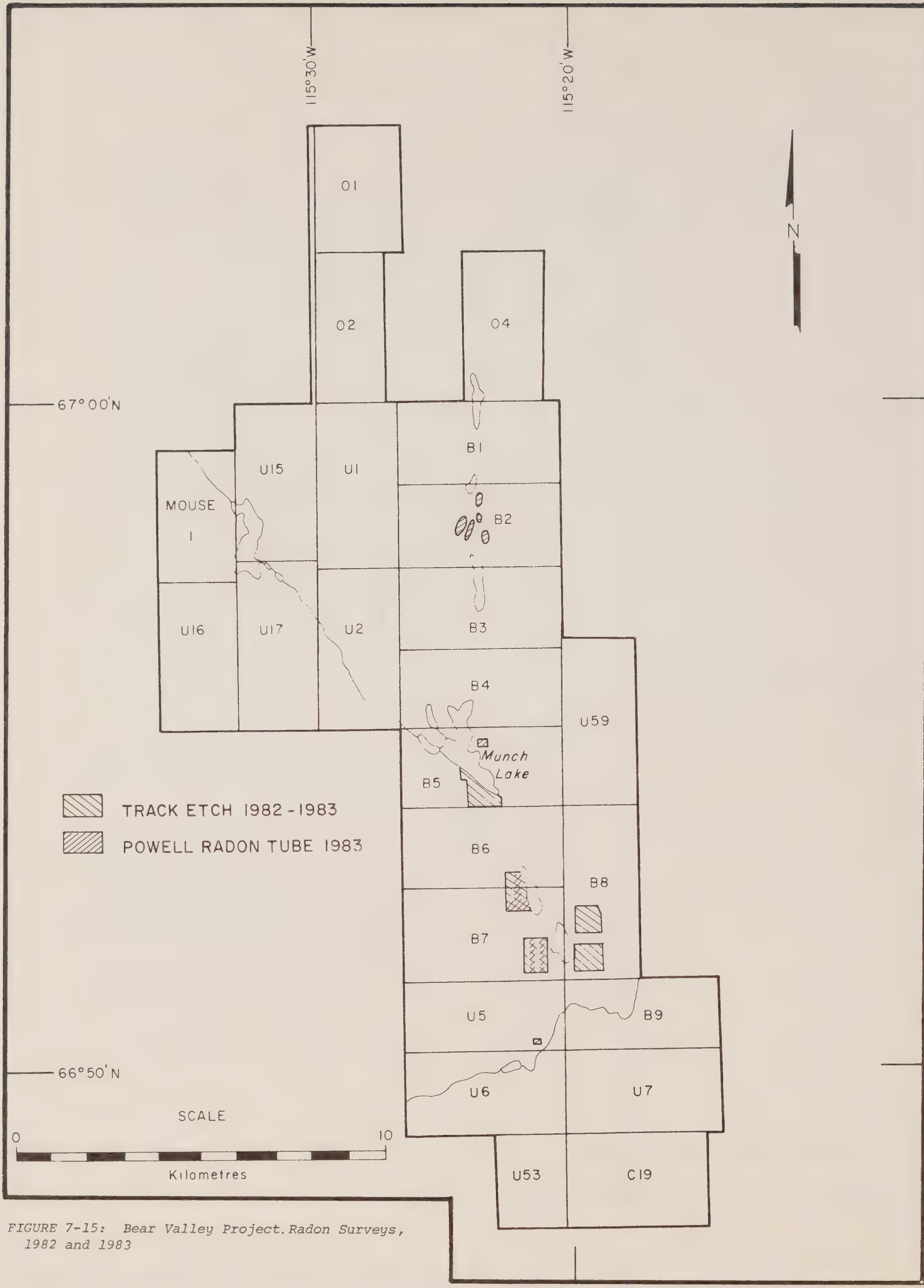


FIGURE 7-15: Bear Valley Project. Radon Surveys, 1982 and 1983

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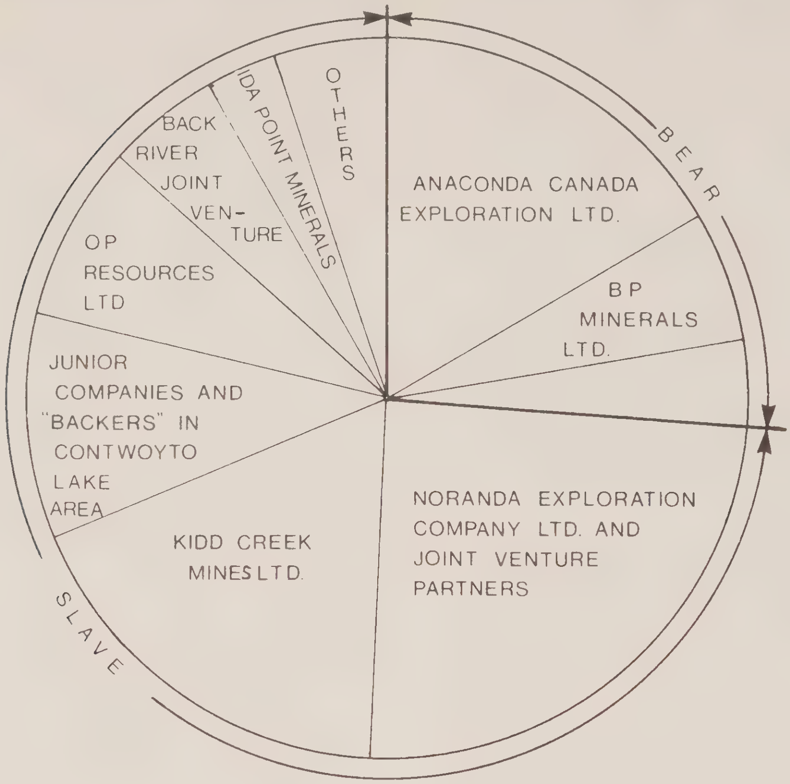
APPENDIX

COMPARISON OF EXPLORATION EXPENDITURES AND THEIR DISTRIBUTION BY COMPANY AND LOCALITY FOR BEAR AND SLAVE STRUCTURAL PROVINCES.



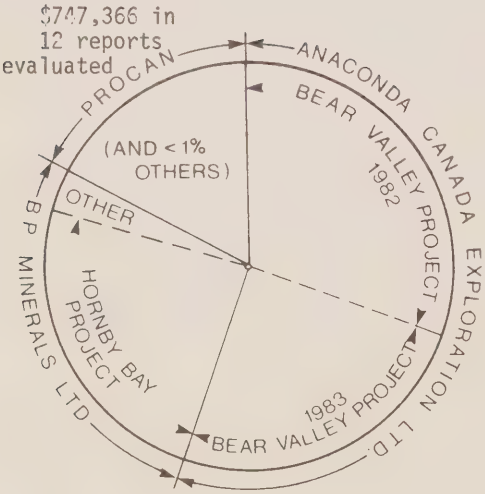
NOTE

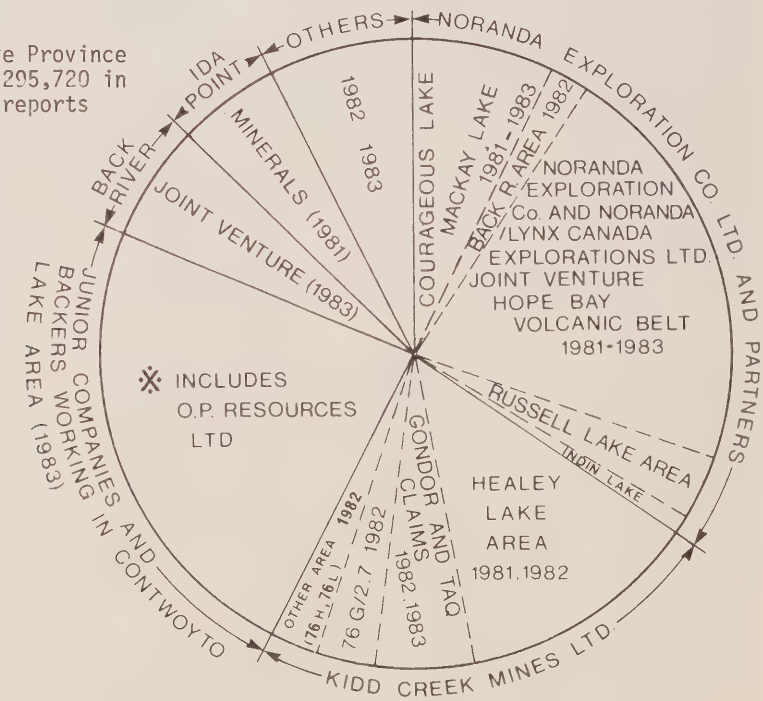
Comparisons are a gross approximation only, because -

1. They are based on assessment work evaluated which includes mainly 1982 and 1983 work, but some 1981 work, together used in compiling the 1982-1983 Mineral Industry Report
2. Work on mining leases eg. at Lupin Mine, Contwoyto Lake is excluded as are some regional surveys
3. Much diamond drilling and some trenching expenditure has been omitted from calculations

Slave Province
$2,295,720 in
41 reports

Bear Province
$747,366 in
12 reports
evaluated





CHAPTER 8: SLAVE STRUCTURAL PROVINCE

by J.B. Seaton, District Geologist, Bear and Slave Structural Provinces, and J.C. Crux, Research Assistant, Northern Affairs Program, Yellowknife, NWT

INTRODUCTION

This introductory section to the Slave Structural Province is essentially the same as that in the 1977, 1978, 1979 and 1980-81 Mineral Industry Reports, but has some modifications in the list of subdivisions under which properties are discussed.

About two-thirds of the Slave Structural Province is made up of sediments and volcanics of the Archean Yellowknife Supergroup that have been metamorphosed under greenschist to upper amphibolite grade conditions (Frith, 1978; Neilsen, 1978; Percival, 1979; Thompson, 1978). The supracrustal rocks, of which about 15% are volcanics, are exposed in sinuous and anastomosing belts locally wrapped around basement gneisses, and commonly flanked, separated or interrupted by quartz-diorite, quartz-monzonite and granite intrusions. Relatively narrow volcanic belts containing various proportions of mafic, intermediate and felsic components are commonly flanked on one, rarely on both, sides by metasediments. The metasediments are predominantly greywacke, commonly interbedded with thinner pelitic layers with phyllitic or slaty cleavage. Topographically recessive phyllite may overlie the volcanics or may be found locally within the volcanic sequence.

Contact relations of granitoid plutons with surrounding supracrustal rocks are generally concordant (Henderson, 1976), although crosscutting granodiorites, quartz monzonites and associated pegmatites have been mapped. Locally the plutons are bordered by migmatite. Contact metamorphic aureoles may be extensive or practically absent.

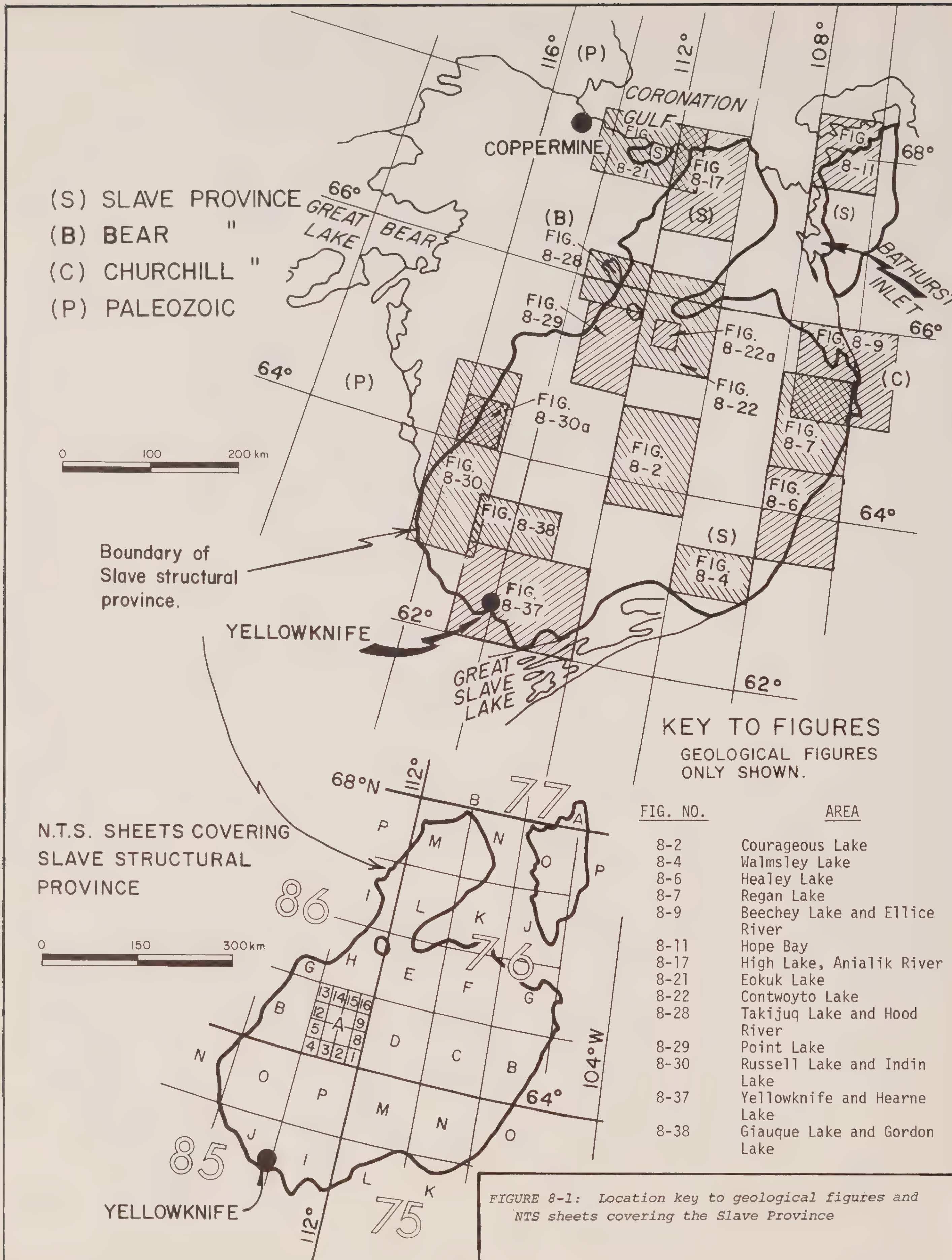
Economic mineral discoveries have been mainly in the volcanics, and consequently these rocks have been more intensely studied. Most of the volcanic belts have been covered - in many cases more than once - by airborne magnetometer and EM surveys which have outlined numerous conductors mostly related to graphitic volcanogenic sediments or extensive zones of disseminated sulphides.

The extent of pre-Yellowknife Supergroup basement is still speculative and will remain so until more geochronological studies and detailed mapping have been done. Locally, plutonic gneisses and massive rocks of tonalitic composition unconformably underlie supracrustal rocks of the Yellowknife Supergroup, as at Point Lake (Baragar and McGlynn, 1976; Henderson, 1977; Henderson and Easton, 1977). Commonly the basal contact of the Yellowknife Supergroup has been obliterated by granitic intrusions. Broad zones of granitic gneiss, migmatite and mixed gneisses, including or derived from Yellowknife Supergroup rocks (unit An of McGlynn, 1977), may include basement that is so far unrecognized. Some tonalitic clasts in the Yellowknife Supergroup sediments may be derived from unroofed syntectonic plutons.

Volcanic belts may comprise more than one cycle of volcanism, as do the Back River Volcanic Complex and the Courageous Lake-MacKay Lake Volcanic Belt. Distally, the volcanics, in most cases, interfinger with the sediments that fill the greater part of the basins. Iron formations within the sediments may be distal products of volcanism. The sediments clearly show complex folding, whereas in the more competent volcanics the effect of such folding is obscure.

Underground development and exploration at the Lupin gold property (76 E/14) is described in Chapter 2, Operating Mines.

Selected references relating to specific parts of the Slave Province or to individual properties are listed in the appropriate sub-sections. Some general references on the Slave Province and some which, by their nature, do not lend themselves to inclusion in property sub-sections (for example, regional, structural, geochemical or airborne radiometric surveys by the Geological Survey of Canada) include: Allan and Cameron (1973); Allan, Cameron and Durham (1973a,b,c); Dillon-Leitch (1979); Baragar and McGlynn (1976); Cameron (1980); Darnley (1973); Darnley and Grasty (1972); Frith (1980a,b, 1981a, b); Frith and Roscoe (1980); Fyson (1980, 1981, 1982); Fyson and Frith (1979); Henderson (1972, 1975a,b, 1976, 1978, 1981); Henderson and Thompson (1980); Heywood and Davidson (1969); King (1982); Lambert (1977, 1978); Lambert and Henderson (1980); Lord (1941, 1942); McGlynn (1977); McGlynn and



KEY TO FIGURES

GEOLOGICAL FIGURES ONLY SHOWN.

FIG. NO.	AREA
8-2	Courageous Lake
8-4	Walmsley Lake
8-6	Healey Lake
8-7	Regan Lake
8-9	Beechey Lake and Ellice River
8-11	Hope Bay
8-17	High Lake, Anialik River
8-21	Eokuk Lake
8-22	Contwoyto Lake
8-28	Takijuq Lake and Hood River
8-29	Point Lake
8-30	Russell Lake and Indin Lake
8-37	Yellowknife and Hearne Lake
8-38	Giauque Lake and Gordon Lake

FIGURE 8-1: Location key to geological figures and NTS sheets covering the Slave Province

Henderson (1970, 1972); Richardson and others (1973, 1974); Ross (1966); Stockwell (1933); and Thompson (1978).

In the following sections, properties have been grouped under 13 headings, indicative of common geological - in a few cases, geographical - settings. These headings are:

- Courageous Lake-Mackay Lake Volcanic Belt;
- Walmsley Lake Supracrustal Belt;
- Healey Lake-Regan Lake Supracrustal Belts and Southern Hackett River Volcanic Belt;
- Beechey Lake Basin;
- Ellice River Area;
- Hope Bay Volcanic Belt;
- High Lake and Anialik River Supracrustal Belt;
- Eokuk Inlier;
- Central ("Olga Lake") Volcanic Belt, and Lupin Mine Area;
- Hood River-Takijuq Lake Supracrustal Belt;
- Point Lake Supracrustal Belt;
- Russell Lake-Indin Lake Supracrustal Belt;
- Yellowknife Supracrustal Basin;

The distinction between volcanic belts and supracrustal belts is arbitrary, in that most volcanic belts include variable amounts of metasediments. Moreover, volcanic belts are separated from one another by granitoid intrusions, by basement or possible basement to the Yellowknife Supergroup, and by metasediments. Hence volcano-sedimentary belts (supracrustal belts) are themselves joined by sediments making precise delineation of individual supracrustal belts rarely possible. The term "supracrustal belt" is used in this report to describe a volcanic belt containing numerous sedimentary units that by volume are an important component of the belt. For convenience some properties underlain by granitoid rocks and marginal to a volcanic or supracrustal belt are included under the appropriate belt title.

Most figures in the 1982-1983 Mineral Industry Report are from McGlynn's (1977) 1:1,000,000 geological compilation of the Bear and Slave Structural Provinces (Fig. 8-1). Though this is adequate and convenient to show the gross geological settings of properties, it requires updating, and should be used in conjunction with references to more recent and detailed work given with each property report.

Table 8-1 lists and records the general nature of work on claims and leases where, for various reasons, work could not be reported in more detail.

An appendix to Chapter 7 on page 286 gives a rough indication of relative expenditures by companies on various projects in various areas and provides a comparison with expenditures in the Bear Structural Province.

COURAGEOUS LAKE-MACKAY LAKE VOLCANIC BELT

This belt (Fig. 8-2) is roughly 60 km long and 5 km wide and trends northwesterly from the vicinity of Nodinka Narrows, on MacKay Lake, to near the north end of Courageous Lake.

Additional work done in this area is listed in Table 8-1.

BERTHA, FAT CLAIMS

Noranda Exploration Co. Ltd.	Gold, Base metals
4 - 2130 Notre Dame Ave.	76 D/3
Winnipeg, Man., R3H OK1	$64^{0}06'35"-64^{0}07'50"N$
	$111^{0}15'35"-111^{0}16'55"W$

REFERENCES

Folinsbee (1949); Henderson (1944); Moore (1956); Padgham and others (1976); Seaton (1983a); Thorpe (1966).

DIAND assessment report 081689.

PROPERTY

BERTHA 1; FAT 10, 15, 16, 62.

LOCATION

The BERTHA 1 claim (Figs 8-2, 8-3) is 240 km northeasterly of Yellowknife. The claim covers part of the shoreline of the eastern arm of Courageous Lake, but lies mainly south of the lake. The southern boundary of BERTHA 1 is about 1 km north of the northern end of Matthews Lake. The FAT claims adjoin the BERTHA 1 claim; those four reported on here are but a few of a much larger group.

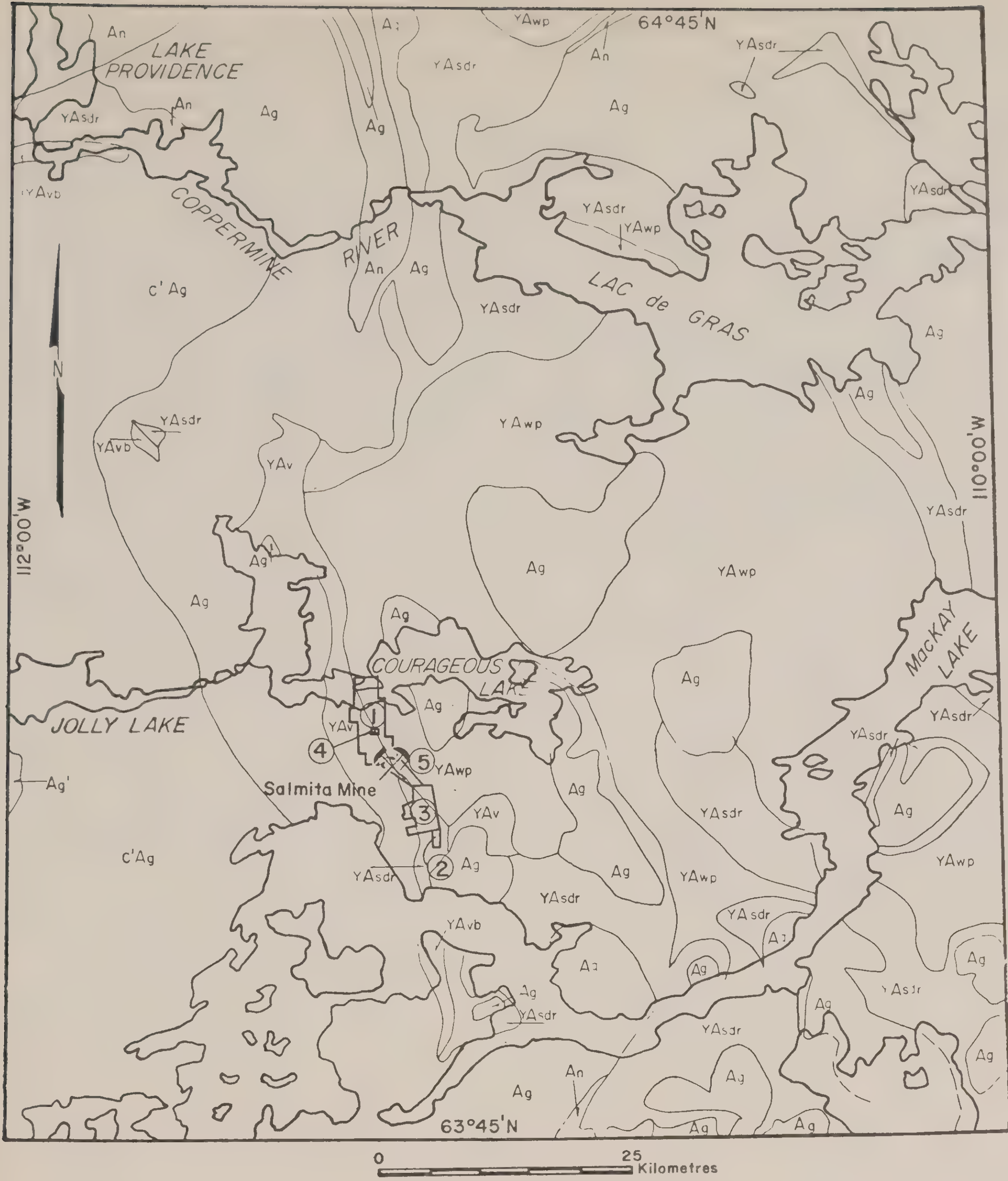
HISTORY

Gold was discovered in the Salmita area on the eastern side of Matthews Lake in 1939. The area now occupied by BERTHA 1 was staked in 1946 as the NASH, KB and TPR claims. It was probably staked a few years earlier under various claim names though information is incomplete.

The first recorded exploration of the property

TABLE 8-1: PROJECTS REPORTED AS DIAMOND DRILL SUMMARIES ONLY, OR REPORTED TOO LATE FOR DETAILED REVIEW IN THIS MINERAL INDUSTRY REPORT

PROPERTY OR CLAIMS	OPERATOR	AREA	LOCATION DETAILS - NTS	LAT., LONG.	YEAR OF WORK	TYPE OF WORK/TARGET COMMODITY
Salmita Mine	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	Near eastern shore of Matthews Lake - 76 D/3.	64°04.5'N 111°14.5'W	1982	Extension of decline, drifting geological mapping, sampling and feasibility study/Au.
Salmita Mine	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	Near eastern shore of Matthews Lake - 76 D/3.	64°04.5'N 111°14.5'W	1983	Preparation for production/Au.
SALERNO 14	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	At Salmita Mine - 76 D/3.	64°04.5'N	1983	Diamond drilling/Au.
RED 24	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	Near northern end of Matthews Lake - 76 D/3.	64°06'N 111°16'W	1983	Diamond drilling/Au.
MAD 13	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	Southern end of Matthews Lake - 76 D/3.	64°02'N 111°12'W	1983	Diamond drilling/Au.
BS 1	Giant Yellowknife Mines Ltd.	Courageous Lake-Mackay Lake Volcanic Belt.	3 km south-southeasterly of southern end of Matthews Lake - 76 D/3.	64°01'N 111°10'W	1983	Diamond drilling/Au.
ARES claims	Noranda Exploration Company Ltd.	High Lake and Anialik River Supracrustal Belt.	Midway between Hood and James Rivers - 76 M/2.	67°02'N 110°51'W	1982	Diamond drilling/Ag, base metals.
CANOE claims	Noranda Exploration Company Ltd.	High Lake and Anialik River Supracrustal Belt.	Northwest of ARES claims - 76 M/3.	67°07.5'N 111°06'W	1982	Diamond drilling/Ag, base metals.
ICE DELTA claims	Noranda Exploration Company Ltd.	High Lake and Anialik River Supracrustal Belt.	At the Hood River - 76 L/15.	66°49.5'N 110°51'W	1982	Diamond drilling/Ag, base metals.
SAXIFRAGE	Noranda Exploration Company Ltd.	High Lake and Anialik River Supracrustal Belt.	5 km south of the Hood River - 76 L/15.	66°47'N 110°54'W	1982	Diamond drilling/Ag, base metals.
Arcadia Property	Canuc Resources Ltd.	High Lake and Anialik River Supracrustal Belt.	North Vein - 76 M/11.	64°42'N 111°22'W	1983	Diamond drilling/Ag, base metals.
SIDD 1-10	Noranda Exploration Company Ltd.	Healey Lake-Regan Lake Supracrustal Belt.	76 G/4	65°09'N 107°49'W	1983	Diamond drilling/Au.
MATE claims	Silver Hart Mines Ltd.	Healey Lake-Regan Lake Supracrustal Belt.	Near Back River - 76 B/13.	64°54'N 107°41'W	1983	Diamond drilling and other exploration/Au.
HOOD claims	Kidd Creek Mines Ltd.	Hood River-Takijuq Lake Supracrustal Belt.	No. 10, 41 and 41 A massive sulphide deposits near Amoogabooga Lake - 86 I/2.	66°05'N 112°45'W	1982	Diamond drilling/Ag, base metals.
REN claims	Kidd Creek Mines Ltd.	Point Lake Supracrustal Belt.	Near Itchen River, between Itchen and Point Lakes - 86 H 6,7.	65°23'N 112°58'W	1982	Diamond drilling/Au.
CUB 1	Echo Bay Mines Ltd.	Point Lake Supracrustal Belt.	North of Itchen Lake - 86 H/10.	65°34'N 112°52'W	1983	Magnetometer surveys, prospecting/Au.
SIK claims	Echo Bay Mines Ltd.	Point Lake Supracrustal Belt.	North of Itchen Lake - 86 H/9.	65°40.5'N 112°24'W	1983	Magnetometer surveys, prospecting/Au.
SKI claims	Echo Bay Mines Ltd.	Point Lake Supracrustal Belt.	North of Itchen Lake - 86 H/10.	65°43'N 112°33'W	1983	Magnetometer surveys, prospecting/Au.
DER claims and Lupin Mine area	Echo Bay Mines Ltd.	Central (Olga Lake) Volcanic Belt and Lupin Mine area.	West of Fingers Lake and 6 km south of Lupin Mine - 76 E/11	65°43'N 111°13'W	1982,3 1983	Underground diamond drilling at Lupin Mine/Au. Diamond drilling/Au.
GONDOR claims	Kidd Creek Mines Ltd.	Central (Olga Lake) Volcanic Belt and Lupin Mine area.	North of Olga Lake in Central Volcanic Belt - 76 E/12.	65°34'N 111°48'W	1983	Diamond drilling of Gondor massive sulphide deposit/Ag.
MAHE	Giant Bay Resources Ltd.	Yellowknife Supracrustal Basin.	North of Knights Bay, Gordon Lake - 85 I/14.	62°57.5'N 113°20'W	1983	Diamond drilling/Au.
VEN	Newcan Minerals Ltd.	Yellowknife Supracrustal Basin.	North of Gordon Lake - 85 P/6.	63°17.5'N 113°03'W	1983	Diamond drilling/Au.
JANE	Newcan Minerals Ltd.	Yellowknife Supracrustal Basin.	Adjoins and lies south of VEN claims - 85 P/6.	63°16'N 113°03'W	1983	Prospecting/Au.
TA	Terra Mines Ltd.	Yellowknife Supracrustal Basin.	At Bullmoose Lake - 85 I/7.	62°20'N 112°44.3'W	1983	Underground development, surface and underground diamond drilling/Au.
Thompson-Lundmark Mine Lease area.	Ardic Exploration and Development Ltd.	Yellowknife Supracrustal Basin.	At Thompson Lake - 85 I/11,12.	62°37'N 113°29'W	1983	VLF-EM, magnetics, IP, sampling of veins/Au.
GOO claims (including leased claims)	Burnt Island Gold Ltd.	Yellowknife Supracrustal Basin.	Burnt Island, Gordon Lake and nearby - 85 P/3.	63°04'N 113°09'W	1982	Diamond drilling (21 holes, 19 on Burnt Island)/Au.
JIM	Kengate Resources Ltd.	Yellowknife Supracrustal Basin.	Gordon Lake - 85 I/14.	62°59'N 113°07'W	1982	Diamond drilling/Au.
MQ-001	Black Ridge Gold Ltd.	Yellowknife Supracrustal Basin.	South shore of Gordon Lake - 85 I/14.	62°55.5'N 113°13.5'W	1982	Diamond drilling/Au.
REG, RGE 2	Eldon Resources Ltd.	Yellowknife Supracrustal Basin.	Near the Cameron River - 85 I/14.	62°48'N 113°12'W	1983	Geology, geophysics, sampling/Au.
NEGUS, PRW, PRWX, CAGEX fraction	Cominco Ltd.	Yellowknife Supracrustal Basin.	At Negus Point - 85 J/8.	62°26'N 114°21'W	1983	Diamond drilling from ice of Yellowknife Bay/Au.
RUSS 1	Noranda Exploration Company Ltd.	Indin Lake and Russell Lake Supracrustal Belt.	Near Discovery Mine - 85 J/13, 0/4.	63°00'N 115°57'W	1982	Prospecting, geological mapping/Au.
WIJ, INN, EDI	Noranda Exploration Company Ltd.	Indin Lake and Russell Lake Supracrustal Belt.	Near Wijinnedi Lake - 85 0/14.	63°57'N 115°11'W	1982	Prospecting, geological mapping/Au.
DON 3,4	Host Ventures Ltd. (now Hot Resources Ltd.)	Indin Lake and Russell Lake Supracrustal Belt.	Near Slemon Lake - 85 N/8.	63°16.5'N 116°06.5'W	1983	Diamond drilling/Au.
DAN 9	Treasure Island Resources Ltd.	Indin Lake and Russell Lake Supracrustal Belt.	Spider Lake - 86 B/6	64°29.5'N 115°08'W	1983	Diamond drilling/Au.
NERAK and other claims	Westsun Petroleum and Minerals Ltd.	Eokuk Inlier	On and near coast of Coronation Gulf - 86 P/9,10.	67°40'N 112°31'W	1983	Geological mapping, prospecting, sampling a vein/Ag.



PROPERTIES

1. BERTHA, FAT claims
2. BS 1
3. MAD, JEJA, REP, WIN claims
4. RED 24
5. SALERNO, TOUGH, LUFF, LT claims

FIGURE 8-2: Regional geology and properties in the Courageous Lake-MacKay Lake Volcanic Belt. Geology from McGlynn (1977).

ARCHEAN

C'An C'Ag	Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup
Ag'	Late or post tectonic granodiorites and quartz monzonites
Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks

YELLOWKNIFE SUPERGROUP

YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks
YAv	Volcanic rocks, undivided

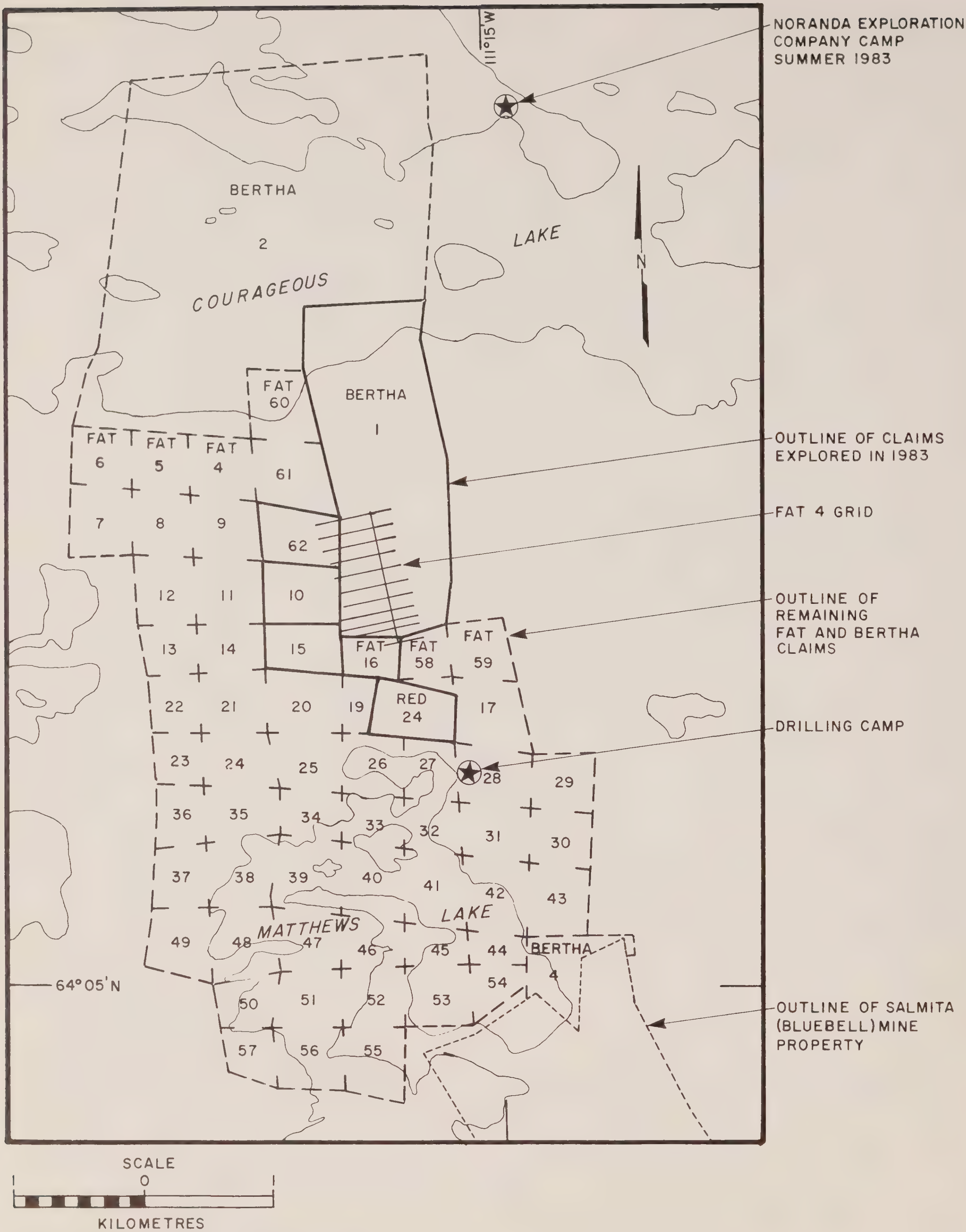


FIGURE 8-3: BERTHA and FAT claims. Claims explored in 1983, in relation to topography and other properties.

was by Giant Yellowknife Mines Limited who, in September, 1964, staked the 23 claim RED group primarily as a copper prospect - the RED group surrounded the MC 5 claim which was later restaked by K. Rasmussen as RED 24 and acquired by Giant Yellowknife Mines. The BERTHA 1 claim covers roughly the northern one fifth of the ground previously staked as the RED claims. In April of 1965 the RED claims were explored by magnetometer and EM surveys (Thorpe, 1966) and four diamond drill holes were completed. In 1973, three more holes were drilled (Padgham and others, 1976), of which two tested northerly trending EM conductors in what was later staked as the FAT 16 claim and the BERTHA 1 claim which adjoins it to the north.

All the RED claims except RED 24 had lapsed by 1975. RED 24 lies about 500 m south of BERTHA 1.

In 1976 Noranda Exploration Company Limited flew a combined EM and magnetometer survey of the Courageous Lake-MacKay Lake Volcanic Belt, following which numerous claim groups were staked to cover anomalies (Seaton, 1983a).

Noranda recorded FAT 1-67 in April, 1977. In sequence from south to north, FAT 63 to 67 inclusive occupied the western half of the area later re-staked by Noranda as BERTHA 1.

In 1977 and 1978 several grids on the FAT and the adjoining STOUT claims were geologically mapped and explored by ground geophysics (Seaton, 1983a). The grids cover AEM anomalies. The Fat 4 grid, which covers the southern part of the area occupied by the BERTHA 1 claim and a smaller area on the adjoining FAT claims (parts of FAT 10, 15, 16 and 62) was explored by horizontal loop-and vertical loop-EM, VLF-EM and magnetometer surveys and by 1:2500 geological mapping in 1977, and by a gravity survey in 1978. The AEM and ground EM surveys outlined a north-northwesterly trending conductor in the western part of the grid. The conductor is coincident with a magnetic high and locally with pyrite- and pyrrhotite-bearing felsic volcanics, greywacke and argillite.

One line of gravity surveying showed several small residual gravity peaks, one of which coincides with the conductor axis.

In the spring of 1981 Noranda staked the BERTHA 1 claim and re-established the Fat 4 grid. A sample of what has been variously described as carbonate-rich sheared rhyolite tuff, and carbonate exhalite collected in 1977, in the east central part of the 1000 m-long by 600 m-wide grid, had assayed 19 g/t Au, so exploration was resumed with an emphasis on gold rather than base metals, which had been the 1977 and 1978 targets. The resumed exploration was in joint venture with Getty Mines Limited.

In 1981 the Fat 4 grid was geologically remapped at 1:1000, and a magnetometer survey covered roughly 70% of the Fat 4 grid - the six winglines at the south end of the grid were not re-established and were not surveyed.

DESCRIPTION

The regional geology of 76 D, which includes the greater part of the Courageous Lake-MacKay Lake volcanics, was mapped by Folinsbee (1949). Henderson (1944) mapped 75 M which includes the southern end of the volcanic belt. Both Folinsbee's and Henderson's maps are at 1:253,440 (1 inch to 4 miles).

Moore (1956) mapped the Courageous Lake-MacKay Lake Volcanic Belt at 1:24,000. The volcanic belt consists essentially of a homoclinal, generally easterly younging, sequence of mafic and felsic volcanics. Noranda geologists have divided the sequence into two cycles of volcanism: a western complex consisting of alternating pyroclastics and intermediate flows, and an eastern sequence (the second cycle) comprising mafic metavolcanics to felsic metavolcanic flows and pyroclastics of the Matthews Lake felsic dome. The BERTHA 1 claim is largely underlain by felsic rocks of the dome. Rhyolitic tuffs are the most abundant rocks mapped on the Fat 4 grid. The tuffs commonly contain quartz eyes. Rhyolitic agglomerates have been mapped in the east-central and northeastern parts of the grid.

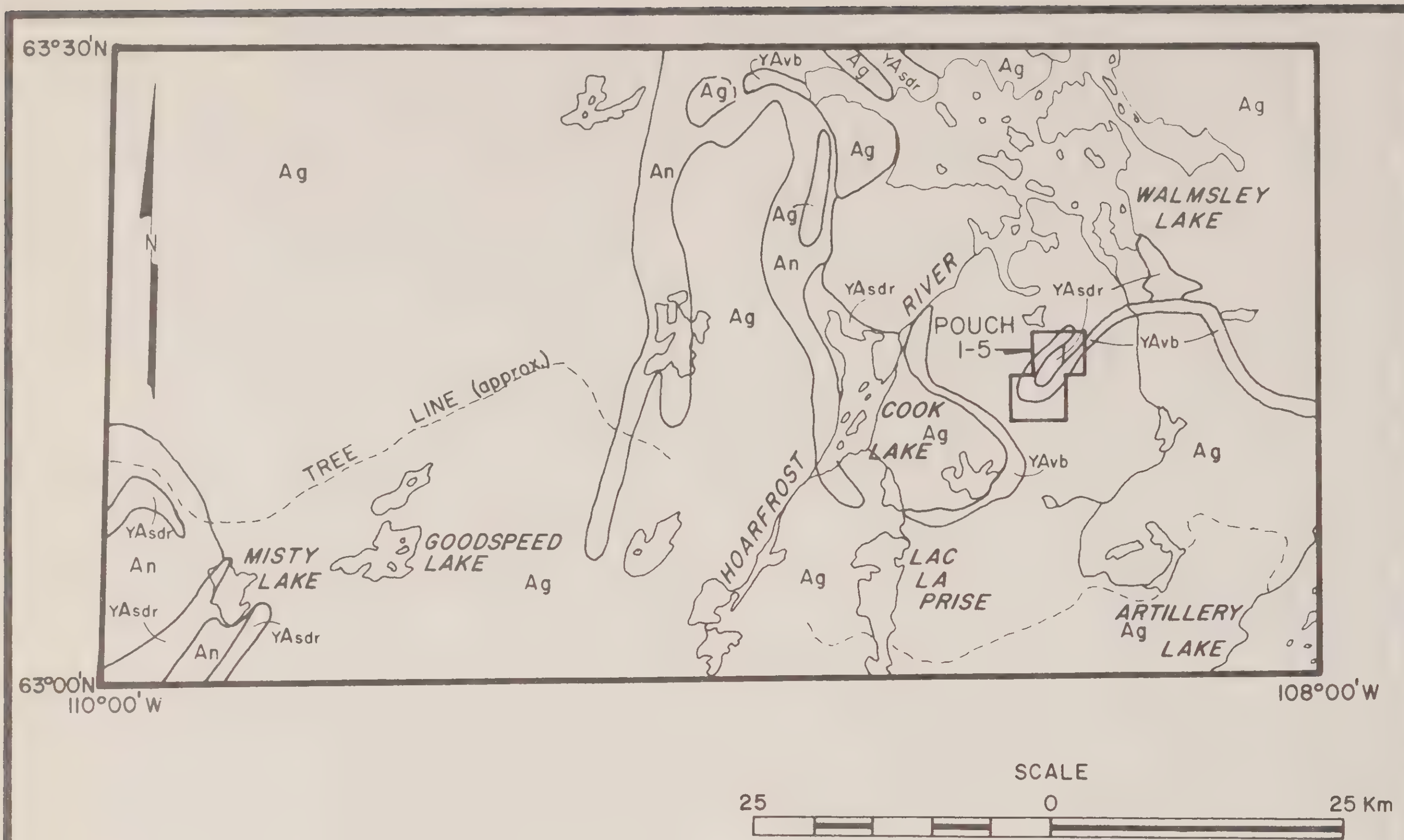
About 400 m south of the gold showing found in 1977, a second gold occurrence was found. A sample of pyritic carbonate-rich rhyolite lapilli tuff assayed 59 g/t Au.

The two auriferous zones contain fine-grained pyrite, pyrrhotite and arsenopyrite.

Two small areas on the Fat 4 grid were found to be underlain by greywacke and argillite metasediments.

CURRENT WORK AND RESULTS

In 1982, two diamond drill holes, inclined at 45^{0} and 65^{0} east-northeasterly to probe the 1977 gold discovery in the east-central part of the Fat 4 grid (Fig. 8-3) intersected rock that yielded



LEGEND

ARCHEAN

Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks
	YELLOWKNIFE SUPERGROUP
YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks

FIGURE 8-4: Walmsley Lake and Hoarfrost River area. Regional geology and property location. Geology from McGlynn (1977).

encouraging gold assays. A total of 290 m was drilled in the two holes.

During 1982 a 900 m by 350 m area of the Fat 4 grid was explored by magnetometer and VLF-EM surveys. The magnetometer survey combined with the results of drilling indicated pyrrhotite concentrations as the main cause of magnetic anomalies. VLF-EM anomalies suggestive of graphitic beds or massive sulphides were not outlined. Lines at 50-m intervals from and including line 300 m N to line 300 m S were in part surveyed by I.P. The I.P. survey delineated zones of disseminated sulphides.

In 1983 much of the BERTHA 1 claim was cursorily prospected, and the entire 0.6 km^2 Fat 4 grid was explored by total field magnetometer and magnetic gradiometer surveys.

Nine holes totalling 1090 m were drilled on the Fat 4 grid during 1983 and as in 1982 encouraging gold assays were reported from drill core.

WALMSLEY LAKE SUPRACRUSTAL BELT

The Walmsley Lake Supracrustal Belt (Fig. 8-4) averages about 2 km wide and extends westerly for about 20 km (straight line distance) from near Artillery Lake, though its sinuous course makes it longer. It is separated from another sinuous and narrow supracrustal belt (the Cook Lake Supracrustal Belt) by about 5 km.

POUCH CLAIM

Canadian Nickel Company Ltd.
Highway 17, West
Copper Cliff, Ont., POM 1NO

Gold, Silver,
Base metals.
75 N/1,2,8
$63^{0}12.5'$-$63^{0}15.2'$N
$108^{0}25'$-$108^{0}30.2'$W

REFERENCES

Folinsbee (1952); McGlynn (1971).

DIAND assessment report 081669.

PROPERTY

POUCH 1-5.

LOCATION

The property (Figs. 8-4, 8-5) is 315 km east-northeasterly of Yellowknife and 13 to 19 km south of Walmsley Lake. POUCH 4 covers the southern half of the property and POUCH 1 the northeastern quarter. The southeastern corner and eastern boundary of POUCH 1 extend into South and North Cavalier Lakes respectively.

The property is largely on 75 N/1.

HISTORY

Gold and sulphides were discovered by the Geological Survey of Canada in 1950 (Folinsbee, 1952).

Details of the date and extent of the earliest staking are not available, but a November, 1952 claim map shows that the property was at that time covered from northeast to southwest by the SAR, CAVALIER and CAV claim groups. The showing on the CAVALIER claims had been tested by x-ray drilling in 1951, though the Mineral Index Sheet prepared by the Mineral Resources Branch, Department of Energy Mines and Resources, states that CAVALIER 1-18 claims were staked in November of 1952 and CAVALIER 19 was staked in July of 1954. The claims were explored by geological mapping in 1954.

From 1951 through 1958 about 1210 m of diamond drilling was completed in 30 holes. In 1958 after North Goldcrest Mines Limited had optioned the property, 940.5 m were diamond drilled in 17 holes on the CAVALIER claims (McGlynn, 1971), and the same year one 47.5 m hole was drilled on the RAD 2 claim, one 46.5 m hole on the PRO 11 claim and two holes totalling 65.5 m were drilled on CON 9 (centred at approximately $63^{0}14'15''$N, $108^{0}27'30''$W). Most of the holes probed the A1 zone (centred at Beavan Lake, $63^{0}13'$N, $108^{0}27'$W) and its projected on-strike continuations, namely the A2 zone (to its northeast) and the E zone (to its southwest). The B zone, which strikes sub-parallel to and is about 180 m northwest of the A zone, was tested by four holes of which two were drilled near the A zone and two about 1.5 km farther west to probe the B zone's continuation around the nose of a fold on the CON 9 claim. Other zones drilled were the Contact zone, 1.25 km north-northeasterly of the A zone, and the No. 26 zone on claim PRO 11, the location of which is not known but probably lies northeasterly of and outside the area later staked as POUCH 1.

Dip needle and EM surveys done on the property in 1958 and 1959 outlined numerous highly magnetic zones and several conductors.

POUCH 1 to 4 were recorded for Canadian Nickel Company (Canico) in July of 1981. POUCH 5 was recorded in December of 1981; it is much smaller than the other POUCH claims and occupies ground previously staked as CAVALIER 19.

DESCRIPTION

The POUCH claims cover the western end of a sinuous belt of metavolcanics and metasediments which extends from longitude $108^{0}00'$W to $108^{0}30'$W, a distance of approximately 25 km (Fig. 8-4). For most of its length the belt is about 2 km wide and consists of volcanics only, flanked by granitoid rocks, but at two localities the metavolcanics are flanked to their north by Yellowknife Supergroup metasediments and the supracrustal belt attains a maximum width of about 5 km. On the POUCH claims, metasediments (Folinsbee, 1952) are exposed in the axial zone of a moderately to steeply north-northeasterly plunging synclinal fold. Canico geologists have suggested that the metasediments mapped by Folinsbee may be better described as felsic tuffs. At the contact between these equivocal schists and a unit of massive and pillowed mafic to intermediate flows, an extensive gossan (the B zone gossan) caps a unit of sulphide-bearing dacitic tuff. The unit has been traced along a strike length of about 3 km and has a maximum width of 50 m. The A1, A2 and E zones are stratigraphically lower in the volcanic sequence and are also formed by a sulphide-bearing dacitic tuff unit, which is capped by a gossan. At the A1, A2 and E zones the volcanics are overturned, since dips are steep to the southeast, but pillows show nearby mafic flows to young to the northwest. A southwest-trending gabbro sill forms the footwall of the A1 and A2 zones, but is separated from the E zone by units of intermediate to mafic

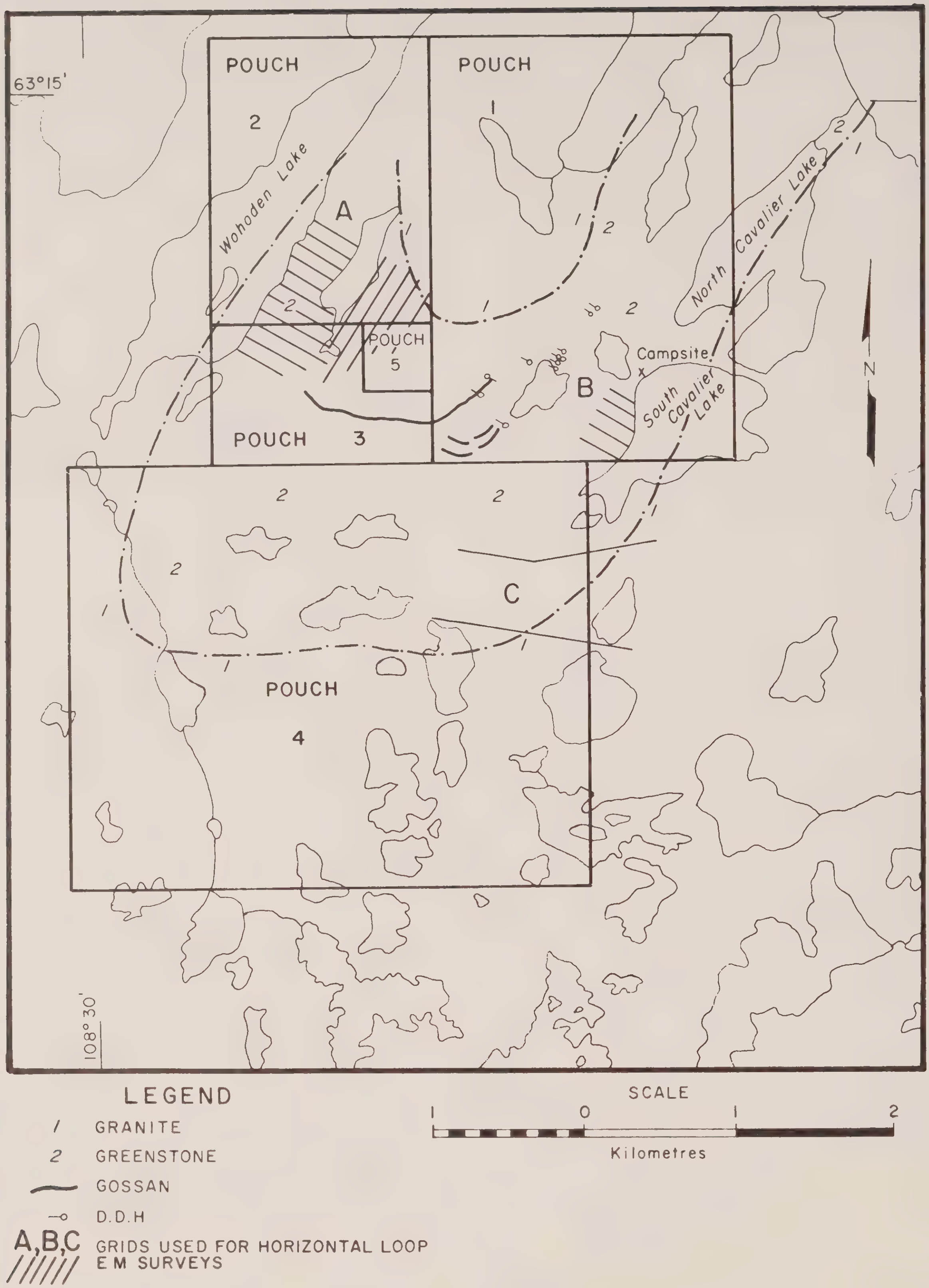


FIGURE 8-5: POUCH claims showing old drill sites, general geology and 1982 grids.

tuff and felsic schist. West of the E zone, the sulphide-bearing tuff can be traced successively westerly and northwesterly around the nose of a northeasterly plunging, overturned synclinal drag fold. The western limb of the drag fold has been intruded in turn by pegmatite and by a northeasterly trending diabase dyke.

Drilling and surface sampling has indicated the best gold and silver assays accompany the highest copper, lead and zinc assays. The best drill-intersection obtained by North Goldcrest Mines graded 6 g/t Au, 139 g/t Ag and 11% combined copper, lead and zinc across 0.3 m.

CURRENT WORK AND RESULTS

In 1982 the POUCH claims were explored by 1:5000 geological mapping and in part by a horizontal loop-EM survey (Fig. 8-5). Gossans and stored drill core were sampled.

It was hoped that magnetic anomalies outlined by the 1958 dip-needle survey might be traced to potentially auriferous magnetic iron formation. Geological mapping, however, did not reveal any iron formation.

The EM surveys did not extend conductors delineated in 1958.

Assay results from more than 400 samples of drill core did not confirm results of previous operators, and chip samples taken across gossans at 75-m intervals or less along strike gave similarly low assays. Four samples assayed from 0.5 to 1.2 ppm Au, but most assayed much less; commonly below 5 ppb Au.

HEALEY LAKE-REGAN LAKE SUPRACRUSTAL BELTS AND SOUTHERN HACKETT RIVER VOLCANIC BELT

A northwesterly trending branch of the northerly trending Healey Lake Supracrustal Belt extends from Healey Lake to Tarantula Lake and thence northerly to the east of the Back River Volcanic Complex to Regan Lake. The northwesterly striking supracrustal rocks include felsic to intermediate volcanics, flanked to the southwest by metasediments, and to the northeast by granitoid gneisses ranging in composition from diorite to granite (Henderson and Thompson, 1982). Figures 8-6 and 8-7, based on McGlynn's (1977) compilation, are used to show property locations relative to gross regional geology, but do not show the Healey Lake Supracrustal Belt or the volcanics between Healey Lake and Tarantula Lake.

The eastern boundary of the Slave Province is still uncertain, but lies at least 15 km to the east of Healey Lake, nearly 35 km east of its position on McGlynn's (1977) compilation.

In the Regan Lake area (Fig. 8-7), Yellowknife Supergroup metasediments bridge the gap between the Back River Volcanic Complex and the Hackett River Volcanic Belt. Locally the metasediments contain iron formation, which in places is auriferous.

Work not described in this section is listed in Table 8-1.

The Hackett River Volcanic Belt (Figs. 8-7, 8-9) extends southeasterly for 100 km from near the confluence of the Mara and Hackett Rivers to the vicinity of Malley Rapids on the Back River. In the Hackett River area the volcanics outline a major syncline, the north limb of which contains the Bathurst Norsemines deposits. The regional geology has been compiled and described by Frith (1981a,b), Frith and Hill (1975), Frith and others (1977), and Frith and Percival (1978).

PROSPECTING PERMITS 814-818

Kidd Creek Mines Ltd.	Gold, Base metals
Box 175, Suite 5000	76 B/2,7
Commerce Court West	$64^{o}15$'N, $106^{o}45$'W
Toronto, Ont., M5L 1E7	

REFERENCES

Henderson and Thompson (1981, 1982); Henderson and others (1982).

DIAND assessment report 081655.

PROPERTY

Prospecting Permits 814-818.

LOCATION

The prospecting permits are at or near Healey Lake, 435 km northeasterly of Yellowknife (Fig. 8-6). The permits cover the following NTS areas:

PROSPECTING PERMIT	NTS SHEETS
814	76 B/2, NE
815	76 B/2, SE
816	76 B/7, NW
817	76 B/7, SE
818	76 B/7, SW

Arms of Healey Lake extend into all permits except for Prospecting Permit 815.

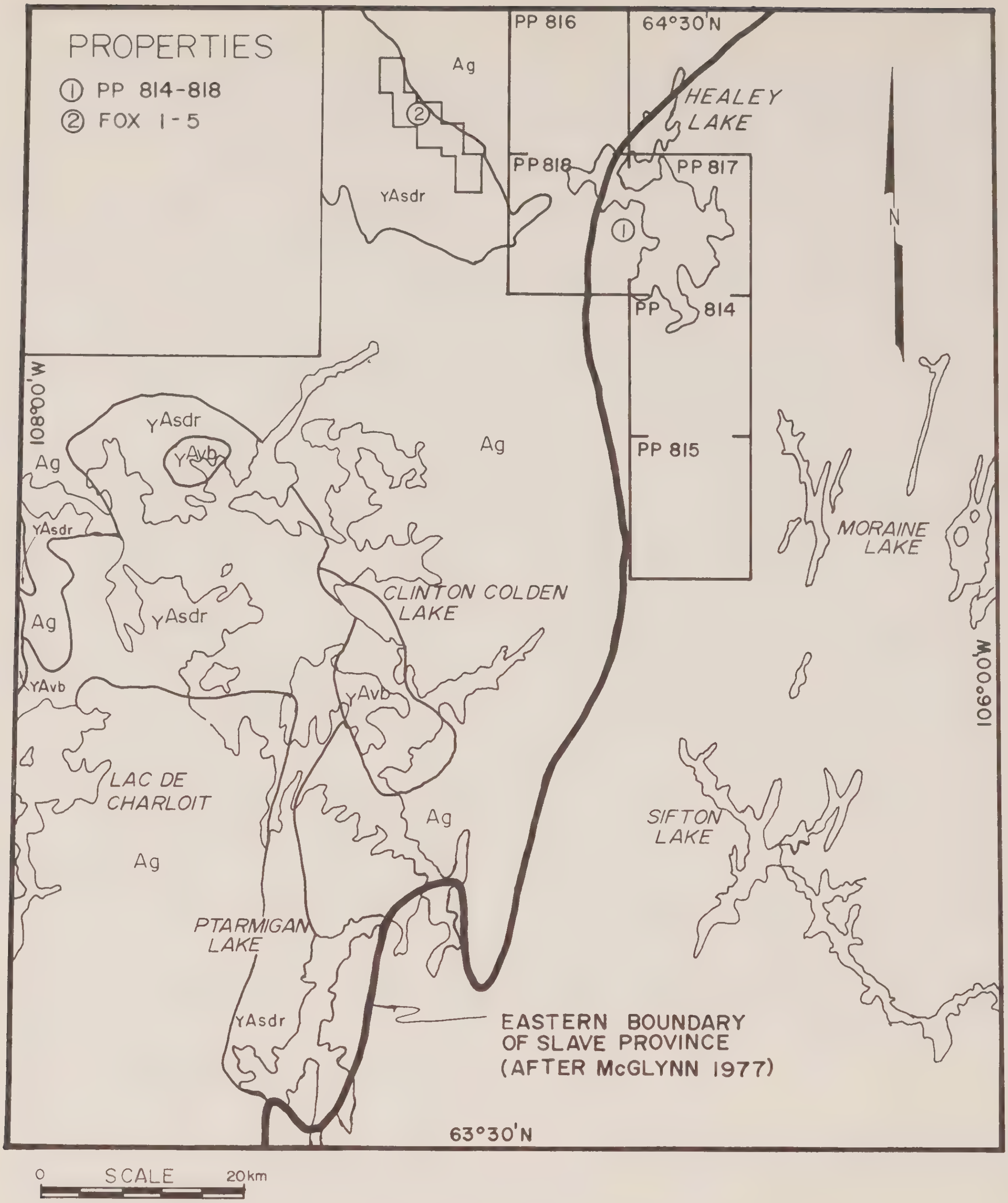


FIGURE 8-6: Regional geology and properties in the Healey Lake Supracrustal Belt. Geology from McGlynn (1977).

LEGEND FOR FIGURES 8-6 AND 8-7

ARCHEAN

Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
	YELLOWKNIFE SUPERGROUP
YAva'	Acidic lava, tuff, ash flow tuff
YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAva	Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks
YAv	Volcanic rocks, undivided

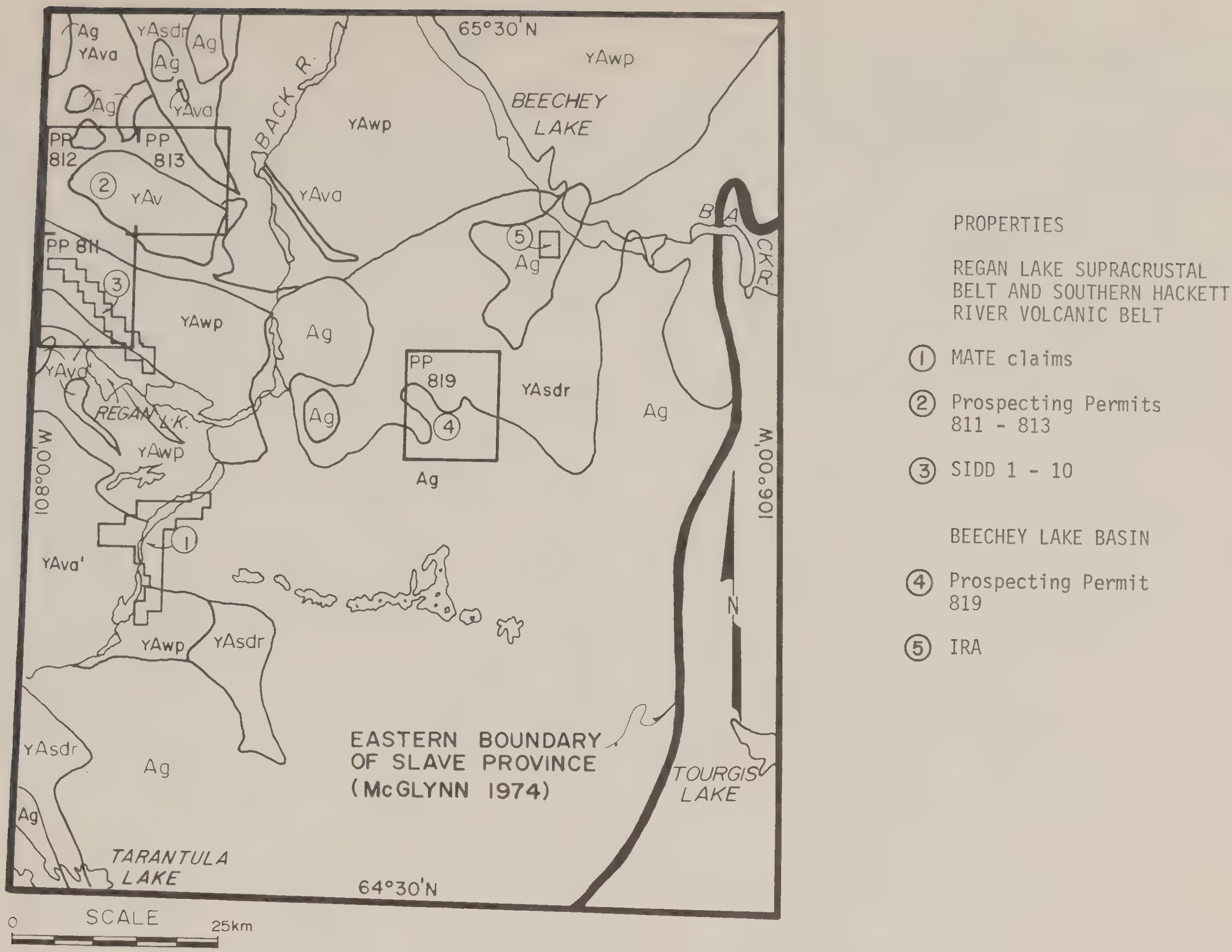


FIGURE 8-7: Regional geology and properties in the Regan Lake Supracrustal Belt, southern Hackett River Volcanic Belt, and Beechey Lake Basin. Geology from McGlynn (1977).

HISTORY

Following 1:50,000 regional geological mapping, prospecting and sampling in 1981, Kidd Creek Mines applied for the permits which were granted in February, 1982. Main exploration targets were auriferous iron formation and volcanogenic base metals.

DESCRIPTION

The geology of the Healey Lake area has been mapped and described by Henderson and Thompson (1981, 1982) and by Henderson and others (1982).

CURRENT WORK AND RESULTS

In 1982, volcanics, which form an almost continuous belt trending northerly successively through Prospecting Permits 815 and 814, generally easterly through Prospecting Permits 817 and 818, and again northerly through part of Prospecting Permit 816, were geologically mapped at 1:20,000. Adjoining areas underlain by granitoid rocks and metasediments were also mapped. The belt locally pinches out just south of Healey Lake but reappears on strike to the north. North and west of Healey Lake the volcanic belt follows a sinuous course through Prospecting Permits 817 and 818 and is continuous with volcanics outcropping on the FOX claim group (p. 300 of this report). A northerly trending spur of the main volcanic belt extends into the southeastern part of Prospecting Permit 816. Volcanics range from mafic to felsic.

Metamorphosed iron formation and other rusty zones were mapped. The iron formation is found mainly

at volcanic-sediment contacts and also within and between units of the volcanic sequence. Iron formations mapped in the Healey Lake area are mainly of carbonate and silicate facies but include lesser amounts of sulphide and oxide facies.

An airborne Input EM and magnetometer survey of the volcanic belts which cross Prospecting Permits 814-818 detected numerous zones of conductors. Most were interpreted as probably caused by pyritic or graphitic units within metavolcanics or metasediments. A few of the EM anomalies were not explained.

FOX CLAIMS

Kidd Creek Mines Ltd.	Gold, Base metals
Box 175, Suite 5000	76 B/6
Commerce Court West	64°24'N, 107°10'W
Toronto, Ont., M5L 1E7	

REFERENCES

Henderson and Thompson (1981, 1982); Henderson and others (1982); Seaton (1984).

DIAND assessment report 081620.

PROPERTY

FOX 1-5.

LOCATION

The property is centred 20 km northwesterly of Healey Lake and 420 km northeasterly of Yellowknife.

HISTORY

The FOX claims (Figs. 8-6, 8-8) were recorded in August of 1981. The claims were staked to cover several large gossans.

After staking, geological mapping and sampling were carried out during 1981 (Seaton, 1984).

DESCRIPTION

The geology of the Healey Lake area has been mapped and described by Henderson and Thompson (1981, 1982) and by Henderson and others (1982).

CURRENT WORK AND RESULTS

An airborne Questor-Input survey was flown over the FOX claims as part of a larger survey covering the Healey Lake area (see Prospecting Permits 814-818, p. 297 of this report).

Geological mapping, prospecting and sampling of the claims, commenced in 1981, was completed. Several zones of iron formation, from lenses a few hundreds of metres in strike length and a few tens of metres wide, to zones several kilometres long and locally as much as 200 m wide were mapped within, and in sediments adjacent to, a northwesterly trending spur of the Healey Lake Volcanic Belt. This spur is composed of mafic to felsic volcanics and has a maximum width of about 2 km. It is flanked to the northeast by granitoid rocks which include granite that is in part pegmatitic and granitic gneiss. The granite is partly at least, intrusive into rocks of the metasediments and metavolcanics, but the granitic gneiss may be basement to the Yellowknife Supergroup. Iron formation mapped by Kidd Creek Mines includes oxide (magnetite), carbonate and silicate facies. The carbonate-facies iron formation is metamorphosed to marble and locally contains a zone of silicates and sulphides (pyrite-pyrrhotite facies). Silicate-facies iron formation also occurs separately. The garnetiferous amphibolites of the silicate facies locally contain small lenses of pyrite-pyrrhotite. The iron-formation lenses and zones are enclosed by felsic or mafic volcanics. They also are found at the contacts between felsic and intermediate volcanics, between felsic volcanics and sediments and between mafic volcanics and sediments. Intermediate and mafic volcanics outcrop to the southwest of the felsic volcanics from which they are partly separated by a tongue of metasediments which pinches out at the southeastern end of the property on FOX 5. Towards the northwestern end of the property, only felsic volcanics are found, flanked on both sides by metasediments that are probably in part volcaniclastic. The spur of volcanics pinches out on FOX 4 claim and a zone of iron formation extends northwesterly from the pinch-out, for about 5 km beyond the FOX claims boundary.

On FOX 5 samples from a thin graphitic exhalite averaged 1% Zn and 0.3% Cu with geochemically anomalous contents of arsenic and gold.

Samples of silicate-sulphide-facies iron formation showed geochemically anomalous concentrations of gold, silver, arsenic, copper, lead and zinc.

Generally, sampling of gossans and iron formations on the FOX claims did not give encouraging results. The sillimanite isograd has been mapped by Henderson and Thompson (1982) as cutting the metasediments of the property area obliquely to, and more westerly than, the strike of the metavolcanics. Kidd Creek Mines geologists have noted occurrences of cordierite, andalusite and garnet. They report that

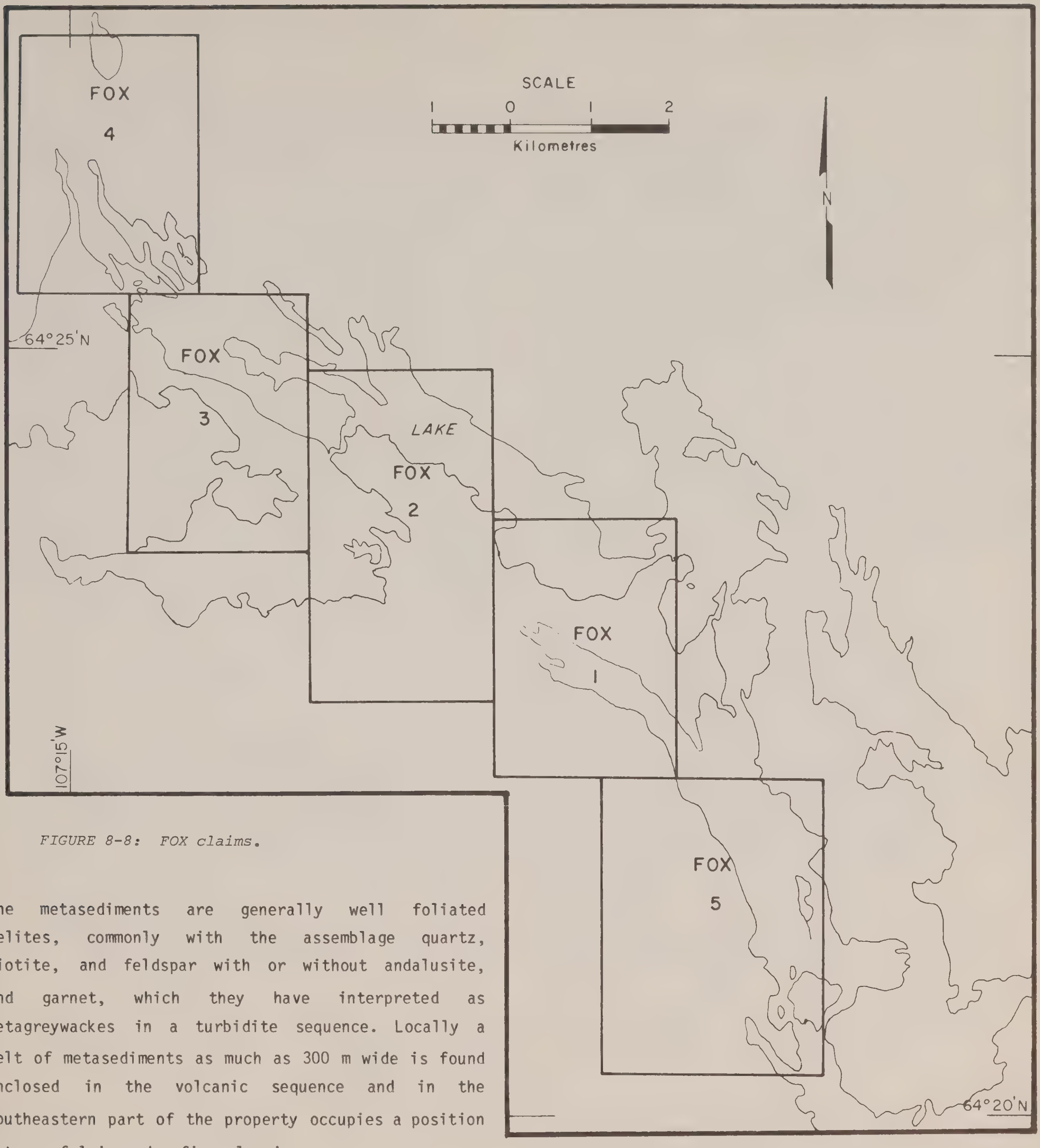


FIGURE 8-8: FOX claims.

the metasediments are generally well foliated pelites, commonly with the assemblage quartz, biotite, and feldspar with or without andalusite, and garnet, which they have interpreted as metagreywackes in a turbidite sequence. Locally a belt of metasediments as much as 300 m wide is found enclosed in the volcanic sequence and in the southeastern part of the property occupies a position between felsic and mafic volcanics.

Foliation is generally parallel to the strike of the rock units and dips steeply to the southwest. The combined airborne Input EM and magnetometer survey delineated many mostly formational conductors. Where these are coincident with magnetic highs they have been interpreted in the light of geological mapping as caused by mixed facies of iron formation. Where the conductors are not coincident with magnetic highs that are believed to be caused by graphitic zones, which may also contain concentrations of pyrite.

PROSPECTING PERMITS 811-813

Noranda Exploration Co. Ltd.	Copper, Zinc,
4 - 2130 Notre Dame Ave.	Silver, Gold
Winnipeg, Man., R3H OK1	76 G/4, 5
	65°16'N, 107°46'W

REFERENCES

Caine and others (1981); Frith (1981a,b); Frith and others (1977); Frith and Percival (1978); Lambert (1981); Lord (1951); Schiller (1965); Schiller and Hornbrook (1964); Seaton (1978, 1983b, 1984); Tremblay (1971); Wright (1967).

DIAND assessment report 081610.

PROPERTY

Prospecting Permits 811, 812, 813.

LOCATION

The permits are 450 km northeasterly of Yellowknife (Fig. 8-7). Prospecting Permit 811 covers part of the Regan Lake Volcanic Belt. Permits 812 and 813 cover part of the Southern Hackett River Volcanic Belt.

HISTORY

Base metal, silver and gold exploration has been carried out in the prospecting permit region since the late 1940's, when gold was discovered on the ALGOOD claim group near Regan Lake (Lord, 1951). Since then portions of the area have been staked as the DON, ACK, QIK, DAWN, ORC, ORB, WAN, MB, DT, CP, AD and HUNT claims (Schiller, 1965; Schiller and Hornbrook, 1964; Caine and others, 1981). More recently, the MUSK group of claims, in the northern half of Prospecting Permit 813, has undergone considerable exploration, which has resulted in the discovery of the MUSK silver-copper-zinc-lead deposits (Seaton 1978, 1983b, 1984).

Prospecting Permits 811, 812 and 813 were issued to Noranda Exploration in February of 1981.

DESCRIPTION

The regional geology of the area is shown in Figure 8-7. Frith (1981a,b), Tremblay (1971) and Wright (1967) have compiled geological maps; the former two at 1:125,000 and Wright at 1:1,000,000. Work has also been done by Frith and Percival (1978), and Frith and others (1977). A map of the southern part of the area has also been compiled by Lambert (1981) at 1:50,000.

CURRENT WORK AND RESULTS

Geological mapping and prospecting were undertaken over the permit areas in the summer of 1982. Maps were compiled at 1:31,680 scale for the three permits and another more detailed map at 1:15,068.5 scale for Prospecting Permit 811.

Permits 812 and 813 are underlain predominantly by east-southeasterly trending Archean metavolcanics of dacitic to rhyolitic composition. These are overlain in places by Archean metasediments. The axis of a large antiform, which covers the three permit areas, strikes northwesterly through the centre of permit 812. Numerous pyritic gossans were found on both permits. Samples taken were analyzed for copper, zinc, lead, nickel, silver and gold. Several copper-zinc showings, mainly in rhyolitic tuffs, were located on Prospecting Permit 813, but no significant showings were found on Prospecting Permit 812.

Prospecting Permit 811 is underlain predominantly by metasediments interbedded with silicate-oxide facies iron formation. Numerous gold showings were discovered associated with arsenopyrite in iron formation or in quartz veins cutting through the iron formation.

BEECHEY LAKE BASIN

The term "Beechey Lake Basin" is used in this report to denote the large area of deposition of metasedimentary rocks centred at Beechey Lake (Figs. 8-7, 8-9). Metamorphic grade increases northwesterly and southeasterly, away from the northwestern end of Beechey Lake. The Beechey Lake Basin adjoins the Hackett River Volcanic Belt (Frith, 1981a,b).

PROSPECTING PERMIT 819

Kidd Creek Mines Ltd.	Gold, Silver,
Box 175, Suite 5000	Base metals
Commerce Court West	76 G/2 SW
Toronto, Ont., M5L 1E7	65°3.25'N, 106°52.5'W

REFERENCES

Cameron and Durham (1974); Frith (1981a,b,c, 1982); Frith and Loveridge (1982); Frith and Percival (1978); Gibbins and others (1977); Seaton (1978); Tremblay (1971); Wright (1957, 1967).

DIAND assessment reports 081656, 080176, 061392, 061344.

PROPERTY

Prospecting Permit 819.

LOCATION

Prospecting Permit 819 is centred 470 km northeasterly of Yellowknife. Casey Lake is in the northwestern part of the permit area.

HISTORY

Wright (1957, 1967) did a preliminary geological reconnaissance and noted a showing of pyrite in granite near Casey Lake. Tremblay (1971) later mapped the Beechey Lake area, which includes Casey Lake.

Prospecting Permit 328, covering 76 G/2, was granted to DuPont of Canada Exploration Ltd. on April 1, 1974 (Gibbins and others, 1977; Seaton, 1978). The permit was explored by geological mapping and prospecting during 1974 (DIAND assessment report 061344). During this work conformable lenses and zones of pyritic chert, pyritic and locally garnetiferous amphibolite, and pyritic, graphitic schist were noted extending north over a distance of 6.5 km from 65°00'N, 106°52'W. One sample of pyritic rock assayed 21 g/t Au. Zinc assays from pyritic beds ranged from trace to 0.4% and copper assays from trace to 0.1%.

In 1975, DuPont continued geological mapping and rock and soil sampling to evaluate gold showings found in 1974. Detailed work was concentrated south and east of Casey Lake and at Long Lake, north of Casey Lake. Samples of sulphide-rich rocks gave no encouraging gold assays (DIAND assessment report 061392).

Prospecting Permit 328 enclosed the Noranda Exploration Co. Ltd. 81-claim NEC group, which was staked in March, 1974, to cover a geochemical lake sediment anomaly discovered during a 1972-1973 regional survey by the Geological Survey of Canada (Cameron and Durham, 1974). Noranda explored the NEC claims by geological mapping and prospecting, and a much larger surrounding area by a combined airborne (Input) EM and magnetometer survey (DIAND assessment report 080176). The geological survey delineated a thin unit of black graphitic slate adjacent and southwest of a thin unit of mafic and commonly pillowed volcanics. These two adjoining units are enclosed in quartz-mica schists, phyllite and greywacke. Several formational conductors delineated by the airborne survey were coincident with or near and parallel to the graphitic unit. Prospecting did not discover any showings.

DESCRIPTION

The northern two-thirds of Prospecting Permit 819 is underlain mainly by metasediments of the Yellowknife Supergroup and the southern third by biotite muscovite granite and (west of Casey Lake) granodiorite, intrusive into the metasediments (Figs. 8-7, 8-9). Intermediate to mafic volcanics underlie a relatively small area east and north of Casey Lake where, according to Frith (1981b,c), they lie on the limbs and near the nose of a northwesterly plunging syncline. That the fold is synclinal seems rather difficult to reconcile with the gross regional picture, which suggests that the Back River Group volcanics (Frith and Percival, 1978) - of which the Casey Lake volcanics are part - are on the limbs of a southeasterly plunging anticline (Malley Rapids Anticlinorium), in which the Back River Group volcanics fringe the older Hackett River Group volcanics from which they are, in part, separated by a belt of metasediments. Except in the northwestern corner of the permit, the supracrustal rocks underlying Prospecting Permit 819 lie on the high-grade side of the cordierite-staurolite isograd.

Frith (1981a) has compiled a geological map of the Nose Lake area, which adjoins the Beechey Lake area, and Frith and Loveridge (1982) have discussed geochronology of granitoid rocks, metavolcanics and metamorphism in the northern Slave Province.

CURRENT WORK AND RESULTS

A 1:1500 geological map of roughly 40km^2 southeast of Casey Lake was prepared. The mapped area covers the synform mapped by Frith (1981b). Kidd Creek Mines geologists also described the fold as synformal. The axial zone of the fold is occupied by metasediments which are flanked on oneside by a belt of iron formation (less than 100 m thick), intermediate volcanics and mafic metavolcanics that together attain a maximum thickness of about 300 m. The metavolcanics pinch out on the northeastern limb of the fold about 4 km south-easterly of Casey Lake, beyond which iron formation, traced northwesterly to the edge of the map area, is both overlain and underlain by metasediments. Near the fold nose and along the southwestern limb of the fold, granitic

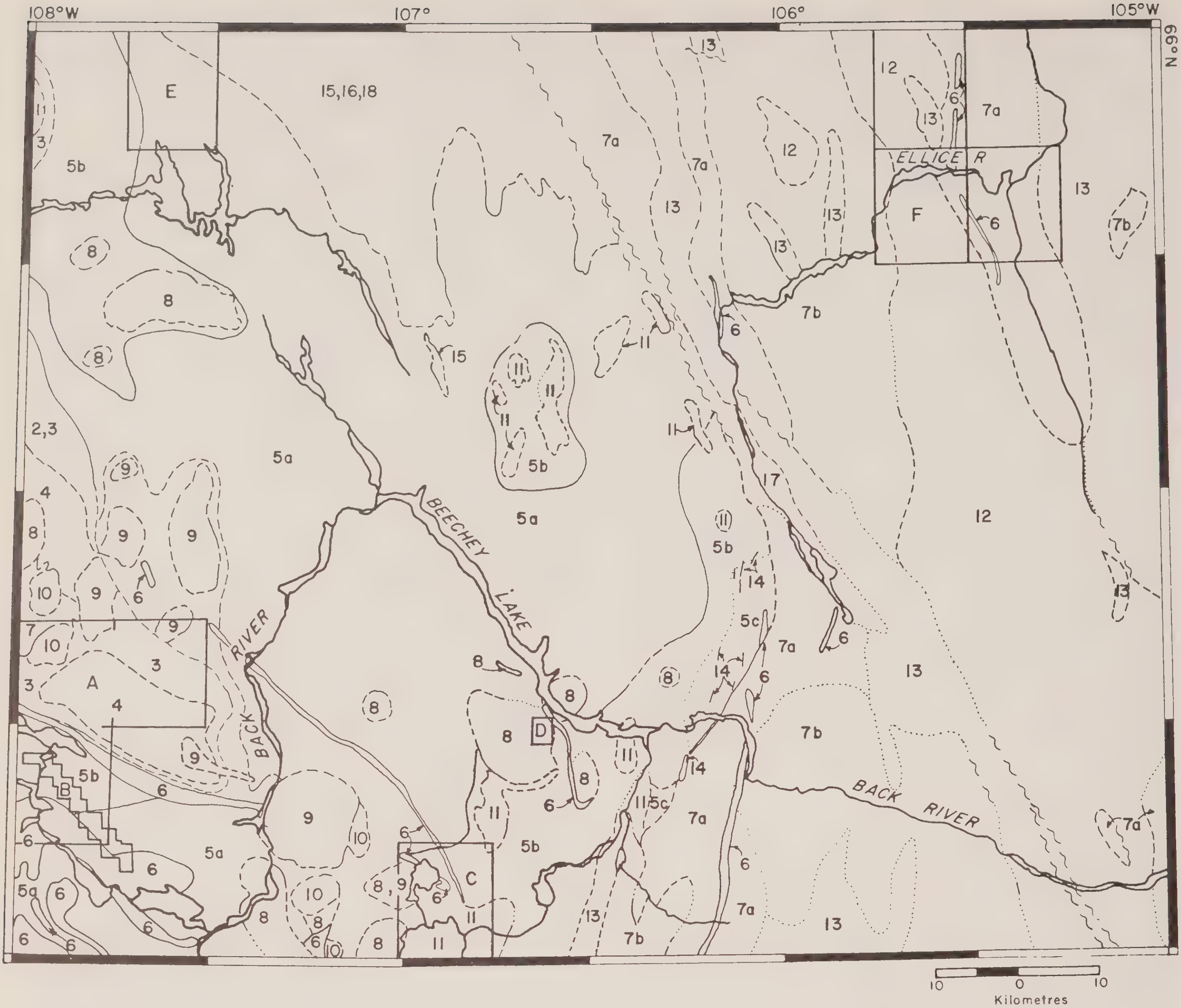


FIGURE 8-9: Regional geology and properties in the Regan Lake Supracrustal Belt, Beechey Lake Basin, and the Ellice River areas. Geology modified after Frith (1981 a,b,c) and Frith, Fyson and Hill (1977).

PROPERTIES

REGAN LAKE SUPRACRUSTAL BELT

(A) Prospecting Permits 811 - 813

(B) SIDD 1 - 10

BEECHEY LAKE BASIN

(C) Prospecting Permit 819

(D) IRA

(E) Prospecting Permit 973

ELLICE RIVER AREA

(F) Prospecting Permits 820 - 822

rocks have intruded metavolcanics and metasediments. A zone of migmatite has been mapped around the fold nose. Supracrustal rocks are locally preserved as lenses a few hundreds of metres long, enclosed in granitic rocks.

The iron formation, which is mainly silicate facies, locally contains as much as 15% combined pyrite and pyrrhotite. Minor oxide-facies iron formation is reported. Systematic sampling of the iron formation did not find geochemically anomalous concentrations of either gold or arsenic.

LEGEND FOR FIGURE 8-9

PROTEROZOIC	18	Gabbro
	17	Ellice River Fm: conglomerate, arkose, shale, sandstone, carbonate
	16	Burnside River Fm: pink quartzite, conglomerate, sandstone, shale, slate
	15	Western River Fm: greywacke, argillite, sandstone, carbonate, conglomerate
AGE UNCERTAIN	14	Pegmatite
	13	Gneiss and migmatite of uncertain origin, includes amphibolite, dioritic, and mylonitic granitized rocks
ARCHEAN	12	Augen K-feldspar gneiss, predominantly granodioritic
	11	Biotite muscovite granite
	8–10	REGAN INTRUSIVE SUITE
	10	tonalite, diorite, quartz diorite
	9	granite
	8	granodiorite
	7	Migmatitic gneiss and migmatite (probably derived from Yellowknife Supergroup)
	7a	biotite gneisses with 10-50% leucosomes
	7b	migmatite with more than 50% leucosomes
	6	Back Group: andesite, basalt and dacite flows, breccia and tuff
	5	BEECHEY LAKE GROUP
	5a	greywacke, mudstone, carbonaceous mudstone
	5b	prophyroblastic gneiss and schist derived from 5a
	5c	biotite gneiss with no porphyroblasts
	1–4	HACKETT RIVER GROUP
	4	dacite, metamorphosed, deformed
	3	felsic and basic flows, fragmental volcanics, volcanic sediments, iron formation
	2	andesite, basalt and dacite flows and fragmentals
	1	biotite-chlorite schist, sericitic schist, mafic amphibole gneiss and quartzofeldspathic gneiss derived from volcanogenic sediments

IRA CLAIM

Kidd Creek Mines Ltd.	Silver,Gold,
P.O. Box 175, Suite 5000	Copper,Molybdenum
Commerce Court West	76 G/2,7
Toronto, Ont., M5L 1E7	65°15'N, 106°40'W

REFERENCES

Frith (1981b,c; 1982); Frith and Loveridge (1982); Frith and Percival (1978); Hill and Frith (1982).

DIAND assessment report 081682.

PROPERTY

IRA.

LOCATION

The IRA claim (Figs. 8-7, 8-9) is at the southeastern end of Beechey Lake (which is a wide, 50-km-long reach of the Back River) and 490 km northeasterly of Yellowknife.

HISTORY

The claim was staked in 1981 to cover chalcopyrite showings discovered earlier the same year during regional geological reconnaissance mapping.

DESCRIPTION

The regional geology of the Beechey Lake area has been compiled and described by Frith (1981b,c; 1982); the stratigraphy described by Frith and Percival (1978); and the geochronology of the adjoining Nose Lake-Beechey Lake area by Frith and Loveridge (1982). Hill and Frith (1982) describe the petrology of the Regan Lake Intrusive Suite.

The IRA claim is underlain by granodiorite of the Regan Lake Intrusive Suite (Hill and Frith, 1982) and by Yellowknife Supergroup supracrustals. The granodiorite underlies about two-thirds of the claim (mainly the western part). Granodiorite also underlies the northeastern corner of the claim. Between the western and eastern exposures of granodiorite a belt of supracrustals, shown as metavolcanics by Frith (1981b; 1982) and as mainly metasediments by Kidd Creek Mines, trends northwesterly and underlies much of the eastern boundary of the IRA claim. Where the belt cuts the

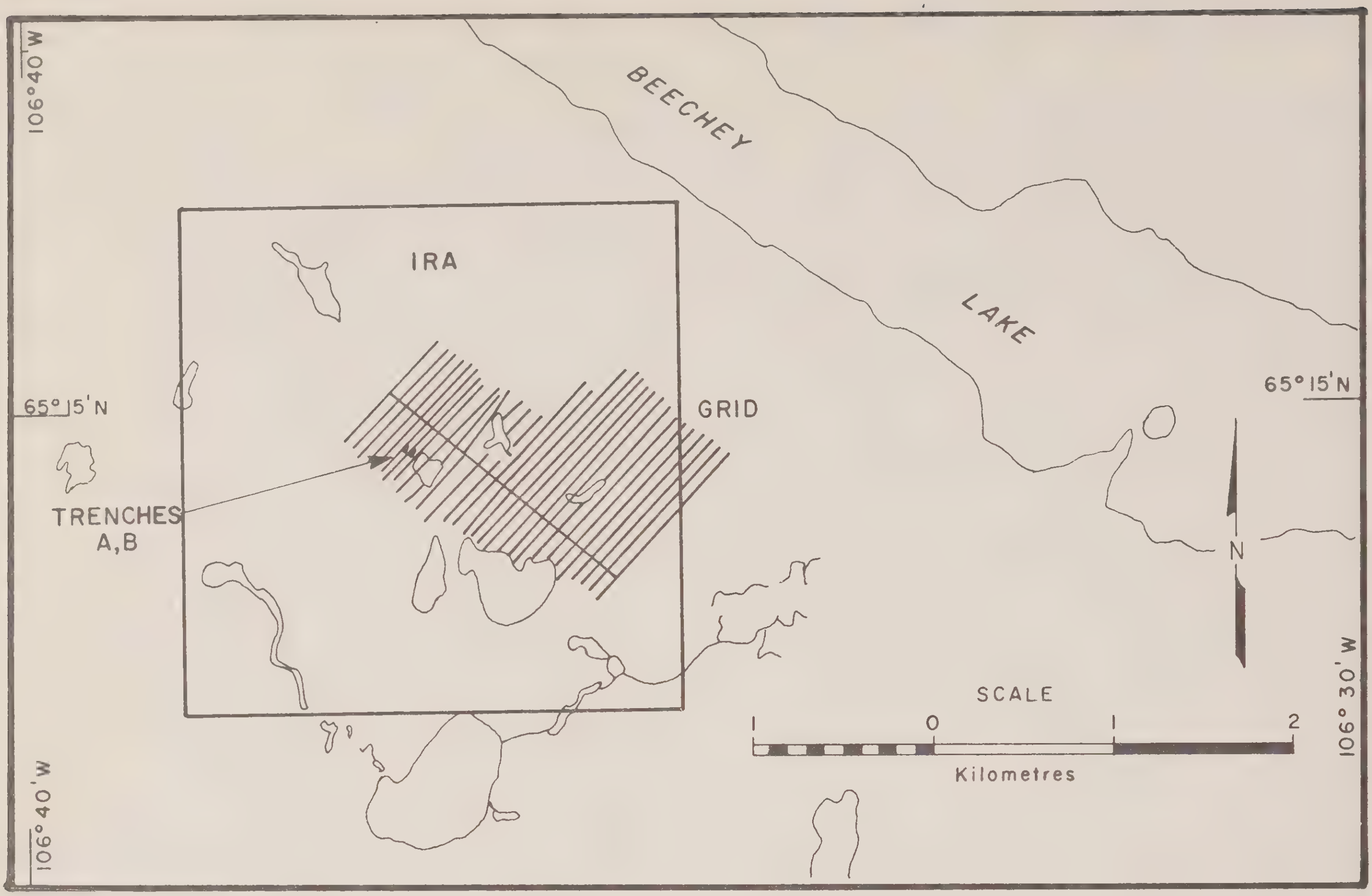


FIGURE 8-10: IRA claim. Claim and grid location.

northern boundary of the claim, it is about 1 km wide.

CURRENT WORK AND RESULTS

A faulted zone of chalcopyrite showings in quartz veins with concentrations of silver, gold and molybdenite was traced for about 1300 m. The zone, which for the most part cuts granodiorite, was explored by establishing a grid in the central part of the claims, which was geologically mapped at 1:2000 and surveyed by VLF and horizontal loop EM. One showing was trenched and sampled.

The geological survey of the roughly 2 km^2 grid shows a few small areas to be underlain by intermediate volcanics that outcrop between metasediments and granodiorite and as small xenoliths within the granodiorite.

An EM conductor was delineated.

PROSPECTING PERMIT 973 — Gold
Trigg, Woollett, Olson — 76 G/14
Consulting Ltd. — 65°56'N, 107°22'W
10504 - 103rd St.
Edmonton, Alta., T5H 2V4

REFERENCES

Frith (1981a); Frith and others (1977).
DIAND assessment report 081705.

PROPERTY

Prospecting Permit 973.

LOCATION

The permit area is 520 km northeasterly of Yellowknife (Fig. 8-9).

HISTORY

In 1982, Trigg, Woollett Consulting Ltd., on behalf of the Back River Joint Venture, undertook reconnaissance prospecting and rock sampling. There is no record in the DIAND archives of exploration work conducted in this area prior to this.

Prospecting Permit 973 was issued to Trigg, Woollett, Olson Consulting Ltd., in February of 1983, on behalf of the Back River Joint Venture. Trigg, Woollett, Olson Consulting Ltd. has a retained interest in, and is the operator for, Back River Joint Venture.

DESCRIPTION

The regional geology is shown in Figure 8-9. According to Frith (1981a) and Frith and others (1977), the area is predominantly underlain by Archean Beechey Lake Group sediments. These comprise shales and greywackes, with minor northwesterly trending, exhalite-facies iron formation. Locally, granodiorite stocks of Archean age have intruded the sediments. Numerous northwesterly trending gabbro dykes of Helikian age associated with the Mackenzie Diabase dyke swarm have intruded the sediments.

CURRENT WORK AND RESULTS

In the summer of 1983, Prospecting Permit 973 was explored for gold. The work comprised reconnaissance and detailed geological mapping, prospecting, trenching, rock and soil sampling, and magnetometer and VLF-EM surveying.

ELLICE RIVER AREA

This area (Fig. 8-9), which covers some of the higher reaches of the Ellice River and its drainage system, was included in the Churchill Province (McGlynn, 1977). However, migmatitic gneiss and migmatites, remapped by Frith (1981b), are thought to have been derived from Yellowknife Supergroup rocks. Therefore, this area would be more aptly placed within the Slave Structural Province.

PROSPECTING PERMITS 820-822

Kidd Creek Mines Ltd.	Copper, Lead, Zinc
P.O. Box 175, Suite 5000	76 H/13,14
Commerce Court West	$65^{0}51$'N, $105^{0}32$'W
Toronto, Ont., M5L 1E7	

REFERENCES

Frith (1981b,c); Thorpe (1972).

DIAND assessment reports 081657, 018784 to 018786.

PROPERTY

Prospecting Permits 820, 821, 822.

LOCATION

The prospecting permits are 580 km northeasterly of Yellowknife and in the Ellice River area (Fig. 8-9).

HISTORY

The area was first explored in 1967 for uranium by the Northwest Syndicate using airborne scintillometer and gamma ray spectrometer equipment. In 1968, several claims were staked and prospecting permits granted. The Eastern Mackenzie Syndicate, Maria Mining Corporation Ltd., and Duvan Copper Company Ltd. held the A claim group, the D 21-40 claims and the D 1-20 claims respectively (Thorpe, 1972). These claims covered part of what is now Prospecting Permits 820 to 822. The Eastern Mackenzie Syndicate undertook exploration over these properties comprising airborne gamma ray spectro-meter surveying, prospecting and reconnaissance geological mapping (DIAND assessment reports 018784 to 018786).

Prospecting Permits 820, 821 and 822 were issued to Kidd Creek Mines in February of 1982.

DESCRIPTION

The regional geology is shown in Figure 8-9. The permits are underlain predominantly by Archean granodioritic gneiss, migmatitic gneiss and migmatite. On the eastern edges of Prospecting Permits 820 and 821 and the western edge of Prospecting Permit 822 is a northerly trending belt of intermediate to mafic volcanics (Frith, 1981b,c).

CURRENT WORK AND RESULTS

Airborne INPUT and magnetic surveys were conducted over the permit areas in June of 1982. Flight lines were 250 m apart. The final maps were compiled at 1:20,000 scale.

Several strong EM conductors were outlined; these do not appear to have any consistent correlation with the magnetic data. The magnetic features were predominantly northerly trending. Most of the conductors are believed to be caused by graphitic horizons in the metasediments and metavolcanics.

HOPE BAY VOLCANIC BELT

This supracrustal belt (Fig. 8-11) is largely composed of volcanic rocks. Felsic volcanics are abundant, but less so than mafic volcanics. The belt

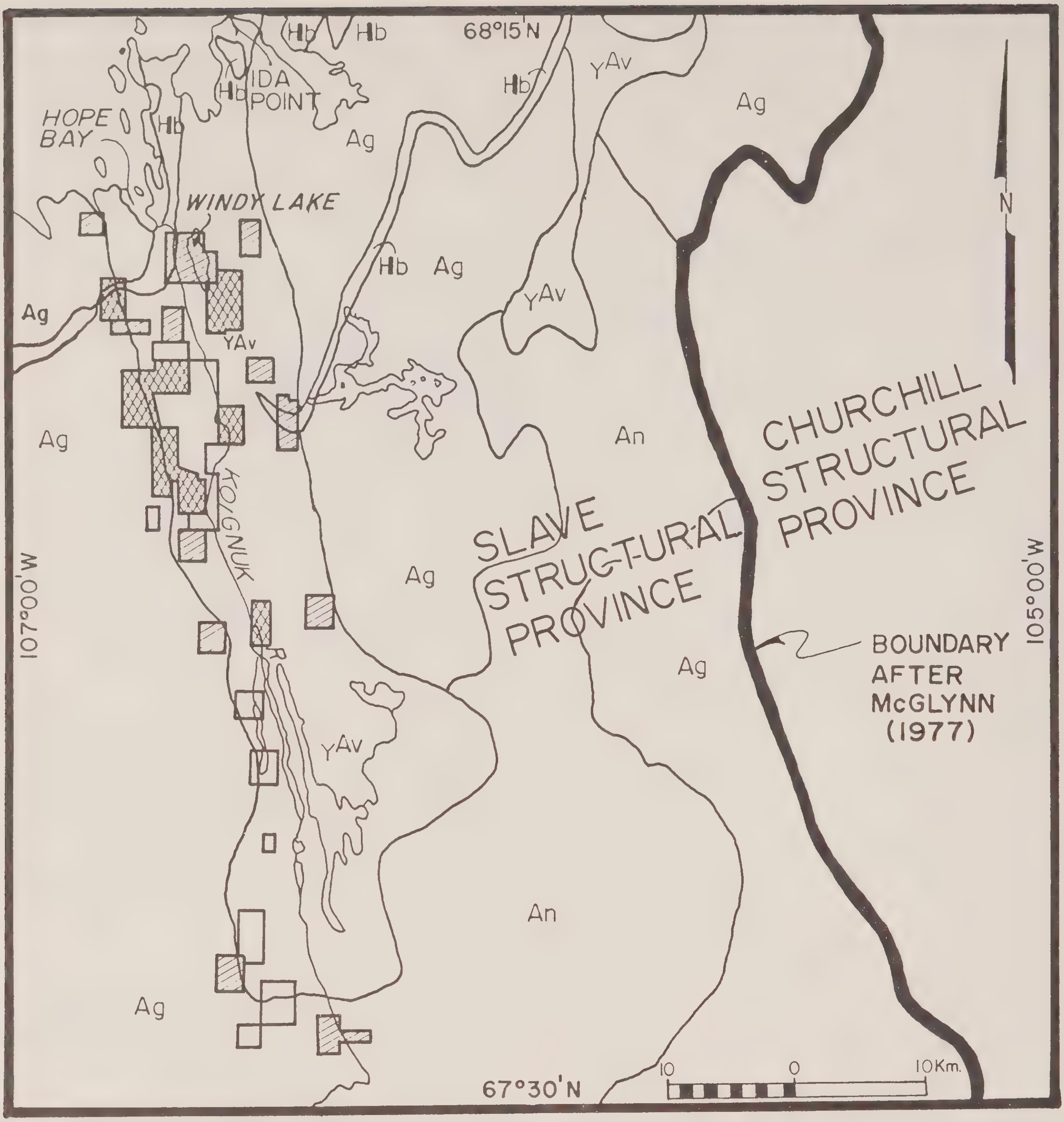
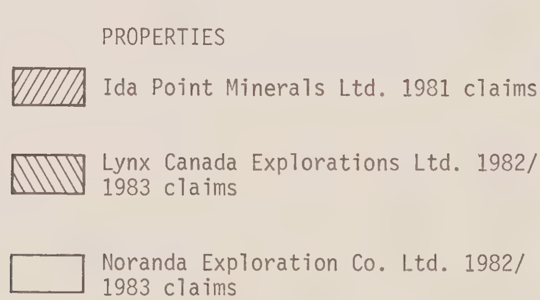


FIGURE 8-11: Regional geology and properties in the Hope Bay Volcanic Belt. Geology from McGlynn (1977).



LEGEND FOR FIGURE 8-11

PROTEROZOIC

Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions

ARCHEAN

Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks

YELLOWKNIFE SUPERGROUP

YAv	Volcanic rocks, undivided

is about 80 km long and averages 15 km in width; it trends north-northwesterly. Its northern end is covered by the waters of Melville Sound.

ADA-ZEL CLAIMS

Ida Point Minerals Ltd.	Gold, Silver, Copper
520 - 25 Adelaide St. E.	76 0/9,10,15,16;
Toronto, Ont., M5C 1Y2	77 A/3
	$67^{\circ}30'$ to $68^{\circ}15'$N,
	$106^{\circ}20'$ to $106^{\circ}50'$W

REFERENCES

Caine and others (1981); Fraser (1964); Gibbins and others (1977); Padgham and others (1978); Padgham and others (1975, 1976); Seaton (1978); Thorpe (1972).

DIAND assessment report 081734.

PROPERTY

ADA, BAG, BAK, BOK, CAM, CAN, DAVE, ED, EVE, GOOD, HEWN, HEWS, JOE, JON, LYNX, MAR, MATT, MEN, NEL, NIC, RICH, SON, TIN, TOO and ZEL claims.

LOCATION

The claims are in the Hope Bay area, 725 km northeasterly of Yellowknife (Fig. 8-11).

HISTORY

The area of the claims was first prospected by Roberts Mining Company and Duncan R. Derry Ltd. in the late 1960's (Caine and others, 1981). Exploration in this area in the 1970's was dominated by the Hope Bay Syndicate, who opened the Hope Bay silver mine in 1973, which ceased production in 1975 (Padgham and others, 1978; Padgham and others, 1975, 1976; Gibbins and others, 1977; Seaton, 1978). In the 1970's, Perry River Nickel Mines Ltd. acquired an interest in the WAN claims (76 0/16, 77 A/3) and work done is summarized by Seaton (1978). A more detailed history of the claims area can be found in the above-mentioned references or in Thorpe (1972).

The ADA - ZEL claims were recorded by Ida Point Minerals Ltd. in August, 1981.

DESCRIPTION

Figure 8-11 shows the regional geology of the Hope Bay area. Geological data has been compiled by Fraser (1964) at 1:506,880.

CURRENT WORK AND RESULTS

The claims (Figs. 8-12 to 8-14, 8-16) were geologically mapped and prospected in the summer of 1981. Five trenches were dug on the BAG, DAVE, JON, LYNX and RICH claims. Samples from trenches, gossans, and quartz veins were analyzed for gold and silver. Two samples were also analyzed for copper. Gold and copper samples locally gave encouraging assays. No samples were taken from the ADA, ED, HEWS and MEN claims.

HOPE BAY PROJECT

(LYNX CANADA EXPLORATIONS LTD. CLAIMS)

Noranda Exploration Co. Ltd.,	Gold, Silver,
4 - 2130 Notre Dame Ave.,	Base metals
Winnipeg, Man., R3H OK1	76 0/9,10,15,16
	77 A/3
	$68^{\circ}07'$N, $106^{\circ}41'$W

REFERENCES

Caine and others (1981); Fraser (1964); Gibbins and others (1977); Padgham and others (1976); Seaton (1984); Thorpe (1972).

DIAND assessment report 081713.

PROPERTY

BOK, BAK, CAN, JON, LYNX, MEN.

ADA, EVE, GOOD, NEL, RICH.

The first six claims were optioned by Noranda Exploration Company Ltd. from Lynx Canada Exploration Ltd. subject to prior agreements between Lynx Canada and Ida Point Minerals Ltd.

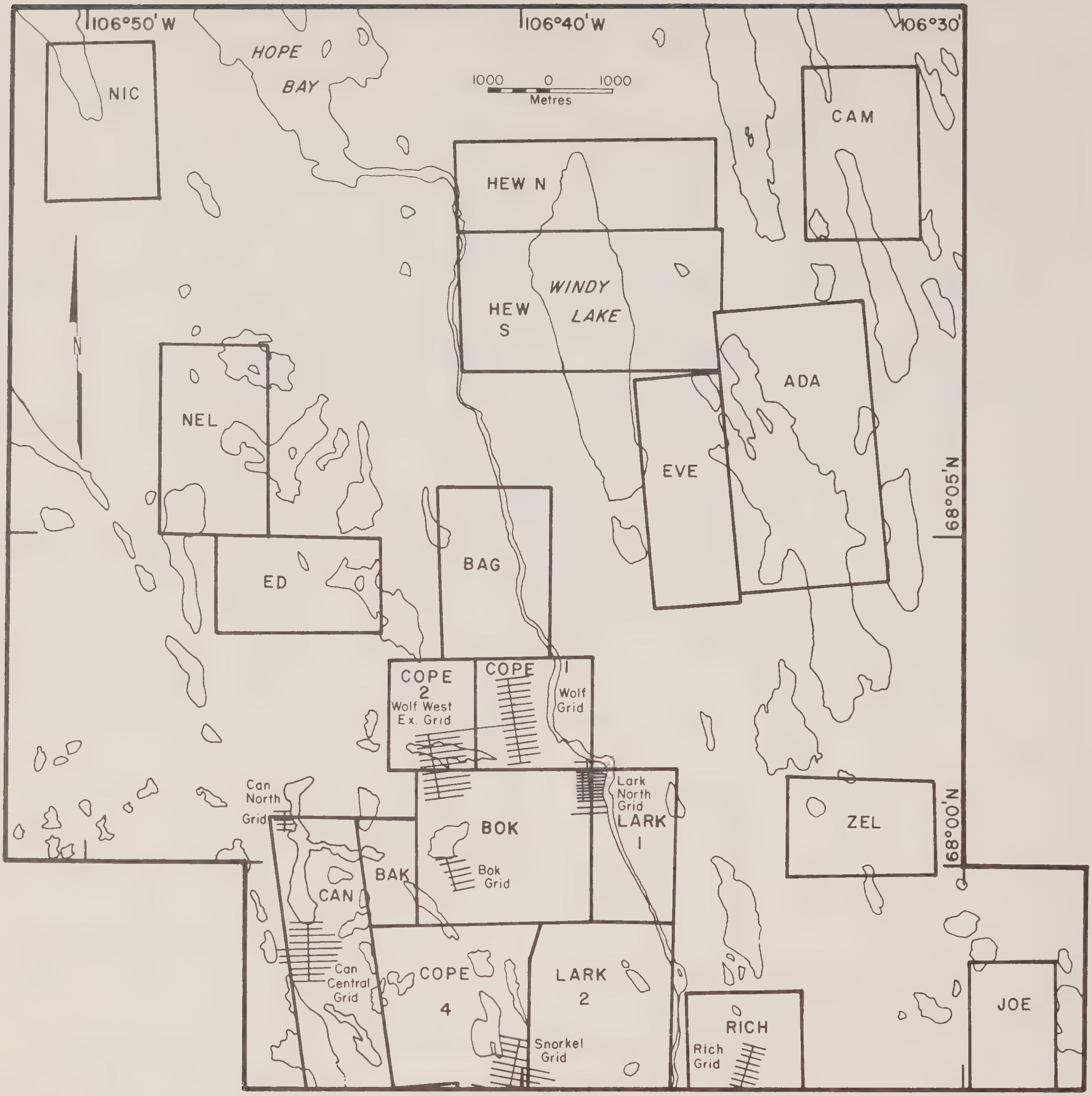


FIGURE 8-12: Properties held by Ida Point Minerals, Lynx Canada Explorations and Noranda Exploration (76 O/15, 16; 77A/3). 1982/1983 grids are shown.

LOCATION

The exploration area (Fig. 8-11) is centred roughly 700 km north-northeasterly of Yellowknife and 130 km south-southeasterly of Cambridge Bay. Coordinates of individual claim centres are given in Table 8-2.

HISTORY

The Hope Bay Greenstone Belt was outlined during a 1962 reconnaissance survey (Fraser, 1964). The history of exploration and mining in the Hope Bay Greenstone Belt has been summarized by Thorpe (1972), who covers the period between 1966 and 1968, and by Padgham and others (1976), Gibbins and others (1977) and Seaton (1984).

Work has included small-scale mining and underground exploration of the Ida Point gold showing

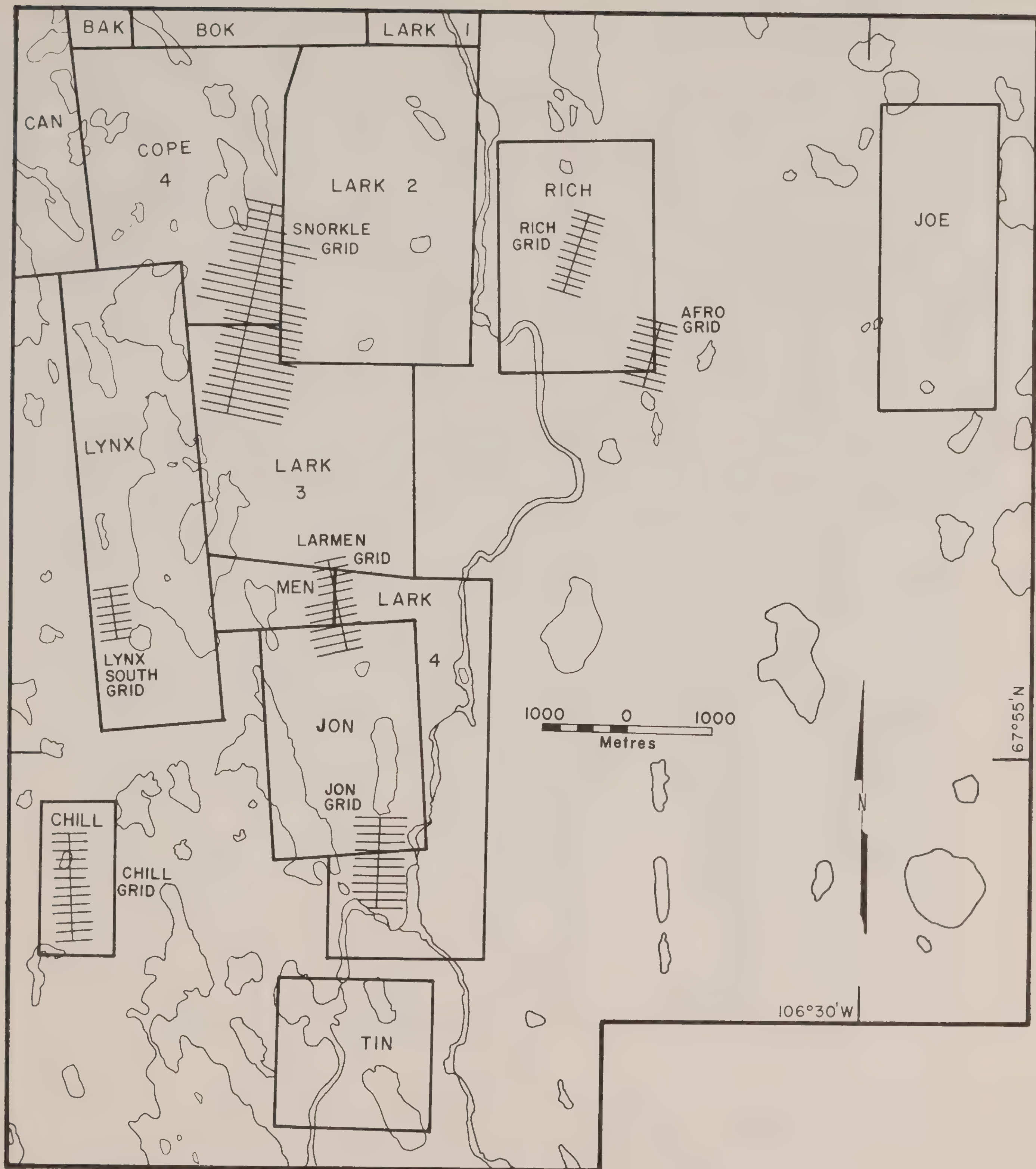


FIGURE 8-13: *Properties held by Ida Point Minerals, Lynx Canada Explorations and Noranda Exploration (76 O/15, 16). 1982/1983 grids are shown.*

FIGURE 8-14: SON, GOOD and MAR claims (76 O/15,16). Properties held by Ida Point Minerals and Lynx Canada Explorations.

TABLE 8-2: SUMMARY OF DETAILED EXPLORATION ON LYNX/IDA CLAIMS IN 1982 (from tabulated summary by Noranda Exploration Co. Ltd.)

Claim	Lat. N	Long. W	Gridded	H.E.M.	Mag	Detailed Grid Geology	Prospected
BOK *	68°00'	106°40'	X	X	X	X	X
CAN *	67°59'	106°44.5'	X	X	X	X	X
LYNX *	67°51.5'	106°42.5'	X	X	X	X	X
MEN *	67°56'	106°40'	X	X	X	X	X
JON *	67°55'	106°39'	X	X	X	X	X
RICH	67°58'	106°34.5'	X	X	X	X	X
ADA	68°03.5'	106°34'					X
EVE	68°03.5'	106°37'					X
NEL	68°03.5'	106°47'					X
GOOD	67°50.5'	106°31'					X
BAK *	68°00'	106°43'					X

* Claims explored by Noranda Exploration Co. Ltd. All claims staked in summer of 1981

and of the silver deposit at a lake unofficially known as Roberts Lake. Companies and organizations which have been active in the area include Roberts Bay Mining Company Ltd., the Hope Bay Syndicate, Hope Bay Mines Ltd. (a subsidiary of New Hope Bay Mines Ltd.), Lynx Canada Explorations Ltd., Duncan R. Derry Ltd., and Derry, Michener and Booth. Several assessment reports that are listed by Caine and others (1981) give details of this work.

In 1977, Noranda Exploration Co. Ltd. carried out 1:31,680 reconnaissance mapping of the Hope Bay Greenstone Belt. They explored the Belt in early 1981 by a combined airborne EM (Input) and magnetometer survey, and during the summer of 1981 were involved in a staking rush in the area in competition with Lynx Canada Explorations Ltd. and Ida Point

Minerals. In the course of this staking rush, Noranda staked 800 claims and Lynx Canada, 603.

DESCRIPTION

The Hope Bay Greenstone Belt (Fig. 8-11) is composed mainly of Yellowknife Supergroup metavolcanics, including mafic, intermediate and felsic lavas, tuffs and agglomerates. Minor units of metasediments, usually black and sulphide-bearing mudstones, are found within mainly volcanic sequences.

North-northwesterly trending and westerly dipping foliation is general throughout the Hope Bay Greenstone Belt. Locally interflow sediments have a near-horizontal dip.

Easterly trending, steeply dipping to vertical

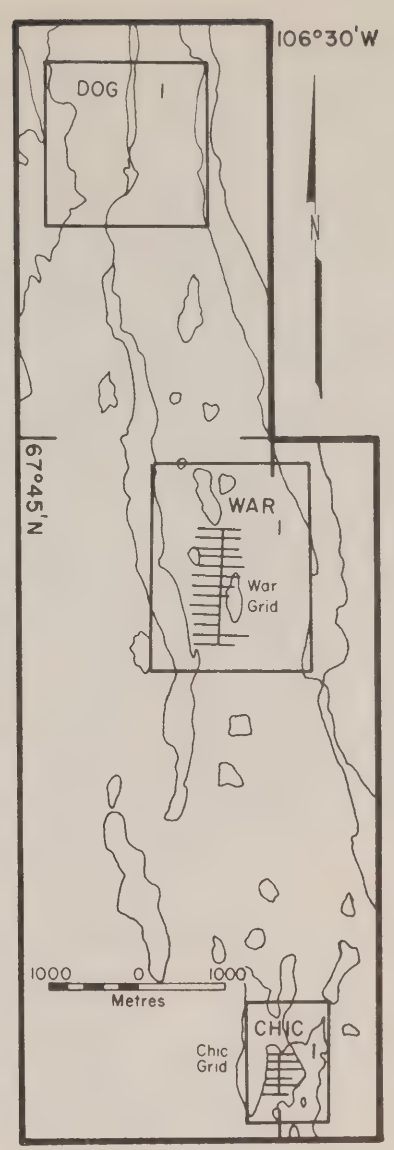


FIGURE 8-15: DOG, WAR and CHIC claims and 1982/1983 grids (76 0/9, 10, 15). Properties held by Noranda Exploration.

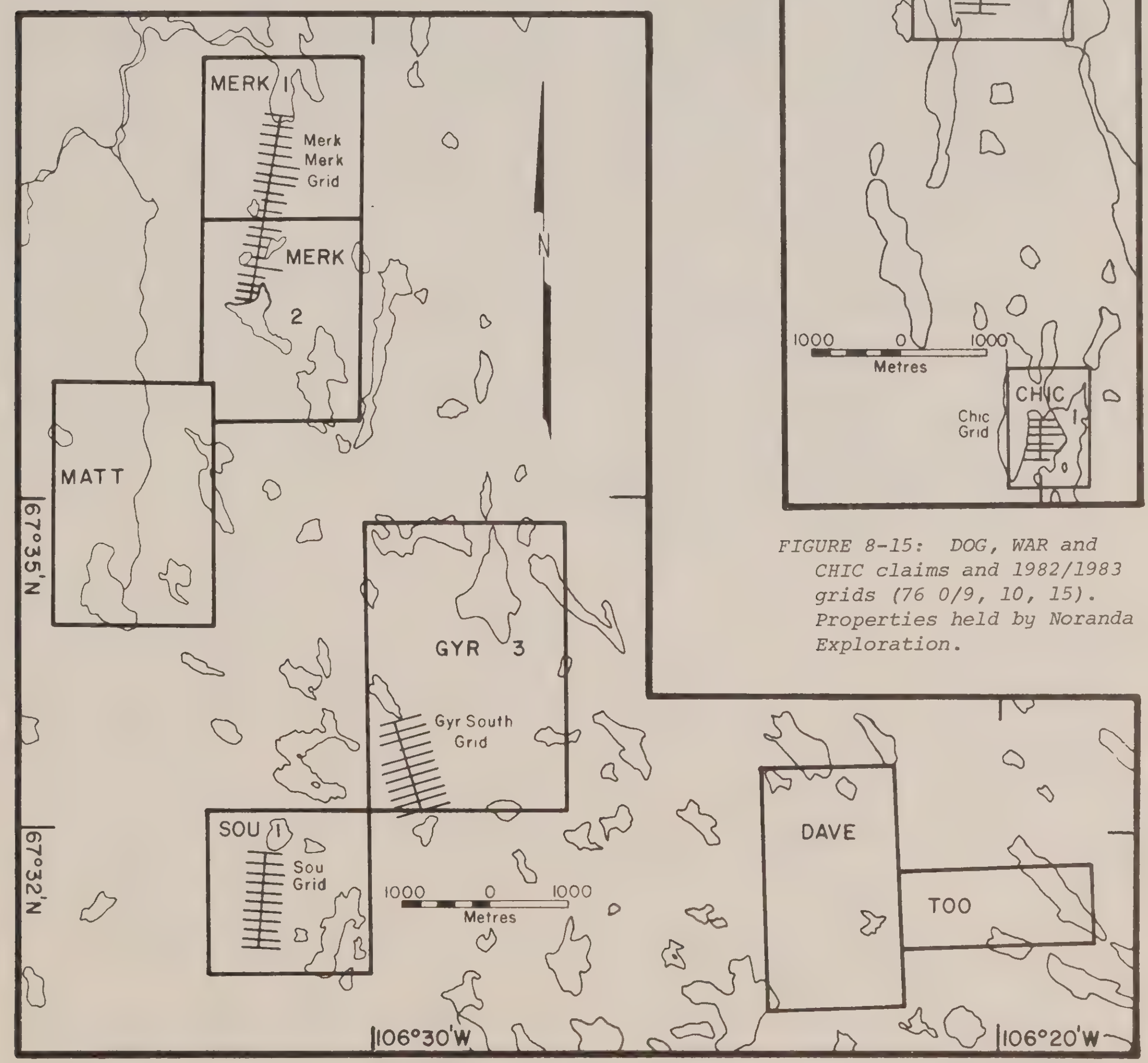


FIGURE 8-16: MERK, MATT, GYR, SOU, DAVE and TOO claims and 1982/1983 grids (76 0/9,10). Properties held by Ida Point Minerals and Noranda Exploration.

fractures locally contain silver, as at Roberts Lake.

CURRENT WORK AND RESULTS

In 1982, ten grids were established to explore anomalies found by the airborne EM survey (Figs. 8-12, 8-13). These were: the Wolf Grid West Extension in the northwestern corner of the BOK claim; the Bok Grid in the southwestern part of the BOK claim; the Lark 1 North Grid at the northeastern corner of the BOK claim and extending onto the adjoining COPE 1, DOK 1 and LARK 1 claims; the Can North Grid, near the northwestern corner of the CAN claim; the Can Central Grid in the west-central part of the CAN claim; the Lynx South Grid in the southwestern part of the LYNX claim; the Larmen Grid covering part of the eastern margin of the MEN claim, the northern margin of the JON claim and the northwestern corner of the LARK 4 claim; the Jon Grid near the southeastern corner of the JON claim and extending across the southern margin of the JON claim onto LARK 4; the Rich Grid in the central part of the RICH claim; and, the Afro Grid at the southeastern corner of the RICH claim.

In 1982, six grids were surveyed by geological mapping, magnetometer and horizontal loop EM surveys and all ten were prospected.

In 1983, additional magnetometer and horizontal loop EM surveys were conducted on the Bok Grid, the Can North Grid, the Can Central Grid and the Lynx South Grid. Gravity surveys were done on the Can North Grid, the Can Central Grid and the Larmen Grid.

During 1983, a total of 194 m of diamond drilling was completed in three holes in search of massive sulphides. Two of the holes were on the Can Central Grid and one was on the Lynx South Grid. In one hole on the Can Central Grid and one on the Lynx South Grid, low (less than 0.5%) zinc concentrations and much lower concentrations of copper were cut over core lengths of one to several metres.

The 1982 and 1983 work was effected from a base camp at Windy Lake. The approximate coordinates of the camp were 68°04'N, 106°37'W.

TABLE 8-3: HOPE BAY PROJECT (NORANDA CLAIMS) EXPLORATION 1981 - 1983

Claim	Grid	NTS	1981	1982	1983
CHIC	Chic	76 0/9,10		Geol., Mag., HEM	
CHILL	Chill	76 0/15		Geol., Mag., HEM	Tr., DD (1)
COPE 1	Wolf	77 A/3 W	Mag., HEM., VLEM., PEM., DD (5)		
DOG		76 0/15			DD (1)
GYR 3	Gyr South	76 0/9		Geol., Mag., HEM	
LARK 1-4	Lark 1 South (LARK 1)	76 0/15	Geol., Mag., HEM	Geol., Mag., HEM	Mag., HEM., Grav.
	Snorkel (LARK 3,4; COPE 4)	76 0/15	Mag., HEM	Geol., Mag., HEM	HEM
	Lark 1 North (LARK 1)	76 0/15		Geol., Mag., HEM	DD (1) (LARK 2)
MERK 1,2	Merk merk	76 0/10		Geol., Mag., HEM	Mag., HEM., Grav., DD (2)
SOU	Sou	76 0/10		Geol., Mag., HEM	DD (1)
WAR	War	76 0/9, 10 (claim) 76 0/9 (grid)		Geol., Mag., HEM	

ABBREVIATIONS:

DD (4), diamond drilling with number of holes. Tr, trenching.

Geol., geological mapping. Mag., Magnetometer. VLEM, vertical loop EM.

HEM, horizontal loop EM. PEM, pulse EM.

HOPE BAY PROJECT

(NORANDA EXPLORATION CO. LTD. CLAIMS)

Noranda Exploration Co. Ltd.	Gold, Silver,
4 - 2130 Notre Dame Ave.	Base metals
Winnipeg, Man., R3H OK1	76 O/9,10,15,16;
	77 A/3
	$67^{o}45$'N, $106^{o}30$'W

REFERENCES

Fraser (1964); Gibbins and others (1977); Padgham and others (1976); Seaton (1984); Thorpe (1972).

DIAND assessment report 081732 and several earlier assessment reports (Caine and others, 1981).

PROPERTY

CHIC; CHILL; COPE 1,2,4; DOG; GYR; LARK 1-4; MERK 1,2; SOU; WAR.

LOCATION

The exploration area (Figs. 8-11 to 8-13, 8-15, 8-16) is centred roughly 700 km north-northeasterly of Yellowknife and 130 km south-southeasterly of Cambridge Bay. Coordinates of individual claim centres are given in Table 8-3.

HISTORY

The Hope Bay Greenstone Belt was outlined by a 1962 reconnaissance survey (Fraser, 1964). The history of exploration and mining in the Hope Bay Greenstone Belt is summarized under Hope Bay Project-Lynx Canada Explorations Ltd. claims (p.310 of this report).

DESCRIPTION

The Hope Bay Greenstone Belt is composed mainly of Yellowknife Supergroup metavolcanics, including mafic, intermediate and felsic lavas, tuffs and agglomerates. Minor units of metasediments, usually black, sulphide-bearing mudstones, are found within mainly volcanic sequences.

North-northwesterly trending and westerly dipping foliation is general throughout the Hope Bay Greenstone Belt. Locally interflow sediments have a near-horizontal dip.

Easterly trending steeply dipping to vertical fractures locally contain silver, as at Roberts Lake.

CURRENT WORK AND RESULTS

Ground follow-up of the 1981 airborne EM (Input) anomalies, initiated in 1981, continued in 1982 and 1983 as shown in Table 8-3.

Conductors tested by drilling were explained by the presence of graphite, pyrite or pyrrhotite. Low zinc concentrations (less than 0.2%) were cut over core lengths of 22 m and 15 m on the CHILL claim.

HIGH LAKE AND ANIALIK RIVER SUPRACRUSTAL BELTS

The High Lake Supracrustal Belt (Easton and others, 1982) is part of a northerly trending complex of mainly volcanic rocks, intruded to the west by extensive granitic plutons and flanked to the east by volcaniclastic, carbonate and turbidite sediments (Fig. 8-17).

The Anialik River Greenstone Belt (Easton, 1982; Tirrul and Bell, 1980; and Jackson and others, in press) is at the northern margin of the Slave Province. Tirrul and Bell describe the belt as comprising "a thick succession of Archean pillow basalts and andesites with significant but restricted accumulations of dacitic to rhyolitic volcanic rocks". The Anialik River Greenstone Belt has been referred to by Seaton (1978) as the Run Lake belt. Run Lake is the unofficial name of a lake at Cominco's RUN claim group.

An "isthmus" of metavolcanics, less than 5 km wide, links the Anialik and High Lake belts.

The KLC, FOG, SNO claims described in this section lie in the High Lake Belt while the DOE and RUN, XVM, FAST claims lie close to the northeastern margin of the Anialik River Belt.

Work not described in this section is listed in Table 8-1.

BO CLAIMS

Kidd Creek Mines Ltd.	Copper, Lead,
P.O. Box 175, Suite 5000	Zinc, Silver
Commerce Court West	76 L/4
Toronto, Ont., M5L 1E7	$66^{o}08$'N, $111^{o}37$'W

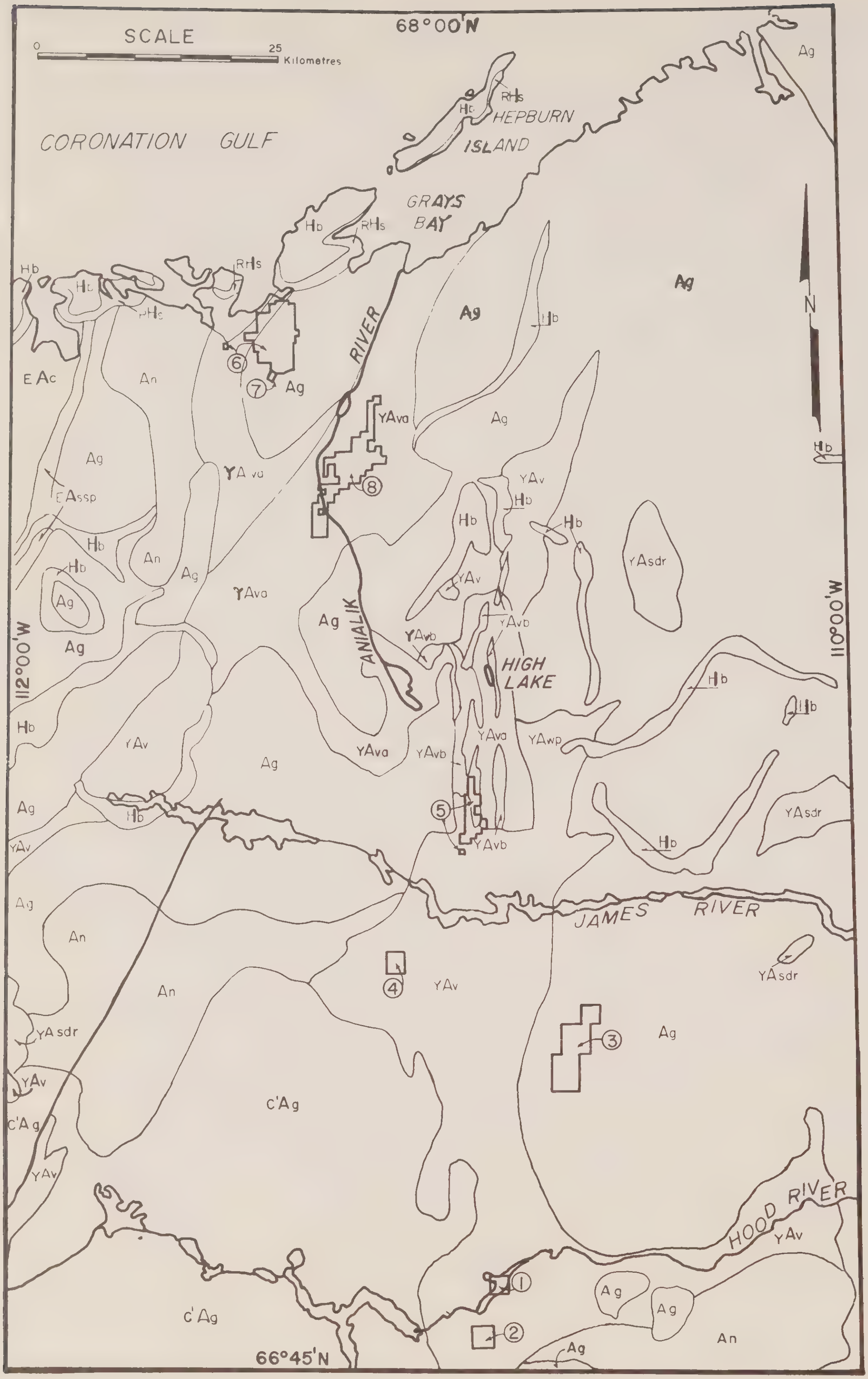
REFERENCES

Fraser (1964); Gibbins and others (1977); Seaton (1978; 1983a); Seaton and Hurdle (1978).

DIAND assessment reports 081604, 080884, 061408, 061345.

PROPERTY

BO 47-51, 69-79, 97-103, 116-119, 125-129.



PROPERTIES

1. ICE DELTA
2. SAXIFRAGE
3. ARES 1 - 3
4. CANOE claims
5. FOG, KLC, SNO claims
6. Arcadia Property
7. DOE
8. FAST, RUN, XVM claims

FIGURE 8-17: Regional geology and properties in the High Lake and Anialik River Supracrustal Belts. Geology after McGlynn (1977)

LEGEND FOR FIGURE 8-17

PROTEROZOIC

- Hb — Gabbro sills and sheets. Includes Coronation and Franklin intrusions
- RHls — Rae Group: sediments, undivided

EPWORTH GROUP

- EAc — Rocknest Fm: dolomite
- EAssp — Odjick Fm: sandstone, shale, mudstone

ARCHEAN

- CAn / CAg — Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup
- Ag — Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
- Ab — Gabbro, anorthosite, diorite and minor ultramafic rocks

YELLOWKNIFE SUPERGROUP

- YAsdr — Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
- YAwp — Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
- YAva — Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks
- YAvb — Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks
- YAv — Volcanic rocks, undivided

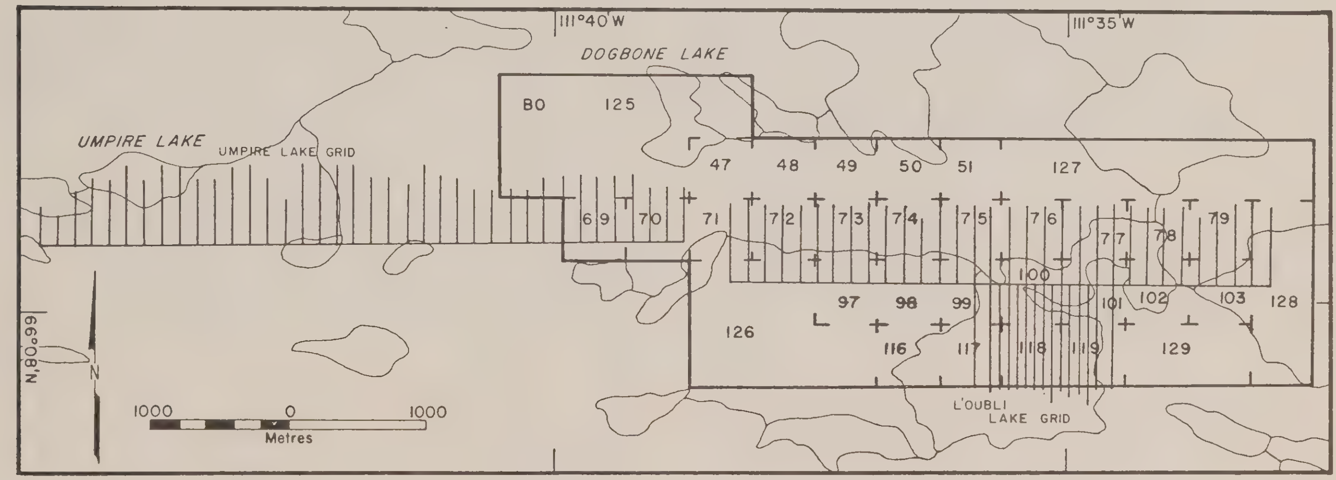


FIGURE 8-18: Grids on and near the BO claims.

LOCATION

The claims are 430 km north-northeasterly of Yellowknife in the southwestern segment of the High Lake Supracrustal Belt (Fig. 8-22, 8-18).

HISTORY

The history of the claims is summarized in Table 8-4.

In January of 1981, Target Exploration Services Ltd. acquired a majority interest in the BO claims from Long Lac Minerals. The claims were then optioned to Texas Gulf Incorporated, now Kidd Creek Mines Ltd. Some of the original BO claims that lapsed in 1979 were re-recorded as BO 125-129 in December of 1981.

DESCRIPTION

The regional geology is shown in Figure 8-22. The geology has also been compiled by Fraser (1964) at 1:506,880.

CURRENT WORK AND RESULTS

The 1982 exploration of the BO claims comprised

TABLE 8-4: HISTORY OF THE BO CLAIMS

YEAR	COMPANY, CLAIM	WORK DONE	ASSESSMENT REPORT; REFERENCE
1968 to 1970	Borealis Expl. Ltd., Prospecting Permit 60.	Reconn. geol., airborne geophysics.	Gibbins and others, 1977; Seaton and Hurdle, 1978.
1974	Long Lac Min. Expl., Prospecting Permit 336.	Reconn. geol., sampling, detailed gossan mapping, soil geochemistry.	061345; Gibbins and others, 1977.
1975	Long Lac Min. Expl., Prospecting Permit 336.	Airborne and ground geoph., geochemistry, geology.	061408; Seaton, 1978.
1976	Long Lac Min. Expl., BO 1-120.	Recorded in October.	080884; Seaton, 1983a.
1978	Noranda Expl. Co. Ltd., BO 1-120.	Optioned from Long Lac, reconn. and detailed geophysics.	080884; Seaton, 1983a.

geological mapping, VLF-EM, horizontal loop EM, magnetometer and gravity surveys. Two grids were set up on the claims; the Umpire Lake and the L'Oubli Lake grids (Fig. 8-18).

Geological mapping was compiled at 1:31,680 and 1:4,000 for the L'Oubli Lake and Umpire Lake grids respectively. There is little outcrop exposed on the BO claims. They appear to be underlain predominantly by intermediate to felsic volcaniclastic rocks. To the north and south of the claims are massive mafic volcanics. No new showings were discovered. A previously discovered showing, the Dogbone Lake showing, was re-examined and proved to be in situ frost heave. It is believed to be part of a small sulphide lens.

The geophysical surveys outlined numerous easterly striking conductors, most of which are believed to be caused by graphitic or graphitic-pyritic units.

FOG, KLC, SNO CLAIMS

Cominco Ltd. — Base metals
700 - 409 Granville St. — 76 M/7
Vancouver, B.C., V6C 1T2 — 67°18'N,110°53'30"W

REFERENCES

Padgham and others (1974); Seaton (1978).
DIAND assessment reports 081529, 080187.

PROPERTY

FOG 11,18-22,24; 25 KLC claims; SNO 23.

LOCATION

The claims (Fig. 8-17) are 565 km north-northwesterly of Yellowknife.

HISTORY

The KLC claims, with the exception of KLC 1000, were recorded in June, 1974. KLC 1000 was recorded in July, 1982. Both the FOG claims and SNO 23 were recorded in September, 1974.

Preliminary mapping of the property in July and August of 1974 was followed in 1975 by both airborne and ground EM and magnetometer surveys, and by a soil and rock chip sampling survey and detailed geological mapping (DIAND assessment report 080187; Seaton, 1978).

DESCRIPTION

The regional geology of the area is shown in Figure 8-17. The claims are, in general, underlain by Archean metasediments and metavolcanics. A more detailed map of the geology has been made by Padgham and others (1974) at 1:31,680 and by Cominco in 1975 (DIAND assessment report 080187) at 1:10,000.

CURRENT WORK AND RESULTS

Soil sampling was carried out on two grids over the central part of the property (Fig. 8-19) in June of 1982. A total of 287 samples taken, mainly from frost boils, were analyzed for copper and zinc. Results indicated several scattered anomalies thought to be associated with pyritic cherty tuffite units.

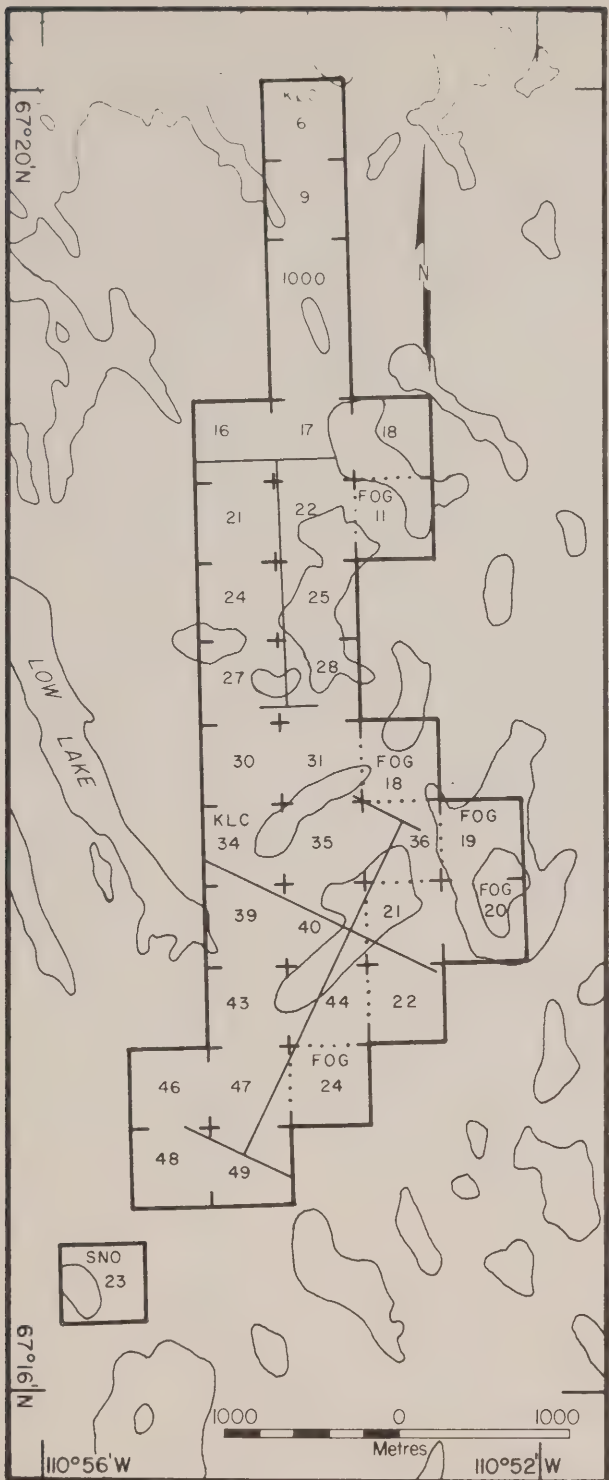


FIGURE 8-19: The FOG, KLC and SNO claims and grids.

DOE CLAIM

Canuc Resources Inc.	Gold, Silver,
26 St. Joseph Street	Base metals
Toronto, Ont., M4Y 1K1	76 M/11
	$67^{o}40'30"N, 111^{o}21'30"W$

REFERENCES

Gibbins and others (1977); Jackson and others (in press); Padgham and others (1976); Seaton (1984); Tirrul and Bell (1980).

DIAND assessment report 081679.

PROPERTY

DOE 1

LOCATION

The claim is 600 km north-northwesterly of Yellowknife and 10 km southwesterly of Grays Bay in the Coronation Gulf (Fig. 8-17).

HISTORY

The DOE 1 claim was recorded in August of 1981 and lies southerly of and adjacent to the Arcadia property, the history of which has been summarized by Seaton (1984), Gibbins and others (1977) and Padgham and others (1976). Numerous large gold-bearing quartz veins have been discovered on the Arcadia property, the most notable being the Sidewalk, North, and No. 1 veins.

DESCRIPTION

The regional geology of the area is shown in Figure 8-17. More recent maps are by Tirrul and Bell (1980) at 1:50,000, and by Jackson and others (in press) at 1:18,520. The DOE 1 claim and Arcadia property are marginal to a branch of the Anialik River Supracrustal Belt.

CURRENT WORK AND RESULTS

The work was done in the summer of 1983 by Watts, Griffis and McOuat Ltd., as consultants to Canuc Resources Inc.

A VLF-EM survey with readings at 30-m intervals was carried out over the claim, but did not detect conductors suggestive of sulphide-enriched gold-bearing quartz veins or sulphide deposits.

Preliminary geological mapping and sampling was also undertaken. The claim is predominantly underlain by a granodioritic stock. Seven samples from a northeasterly striking quartz vein were taken and analyzed for gold and silver. No significant values were reported.

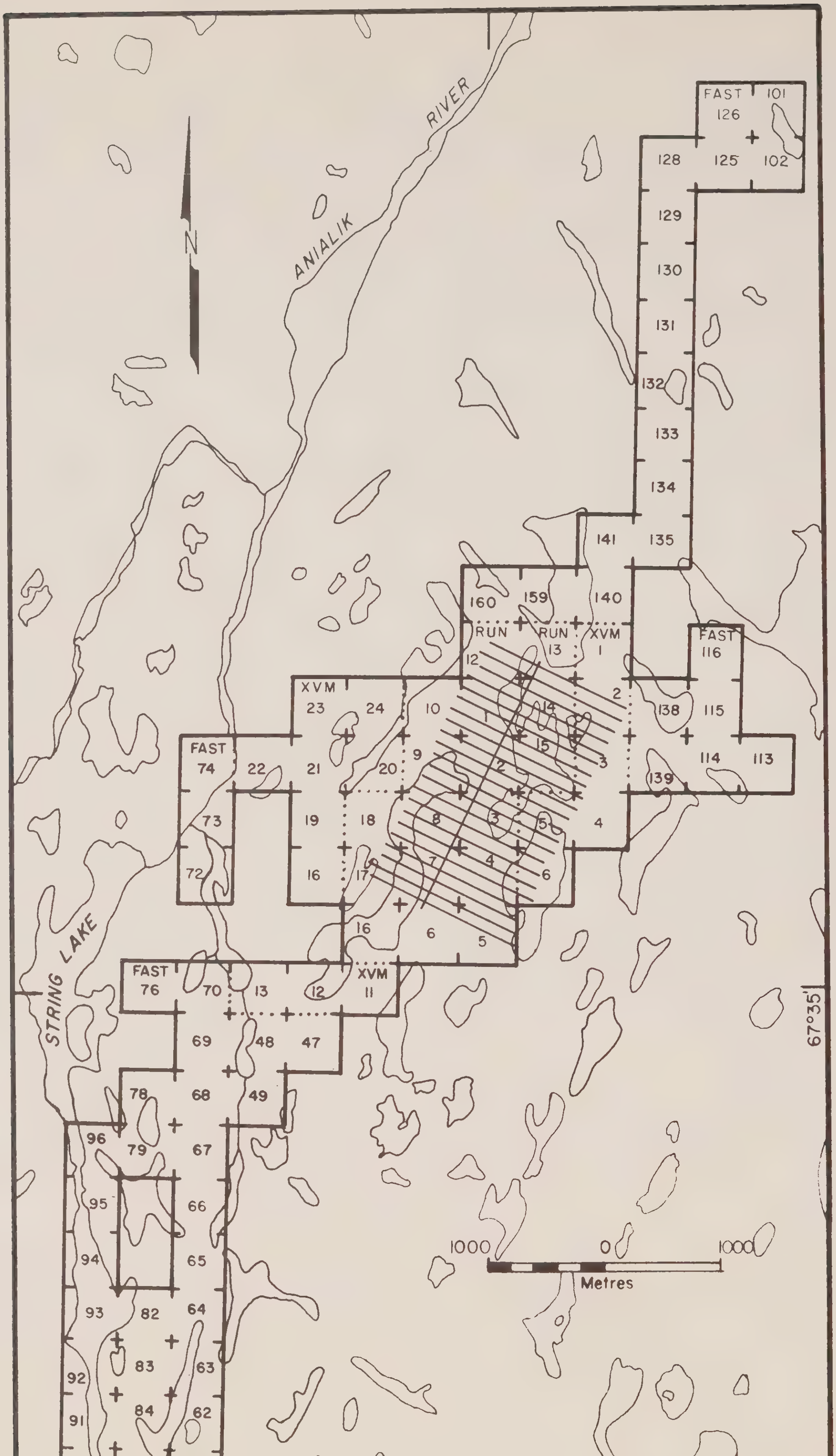


FIGURE 8-20: The FAST, RUN and XVM claims and geophysics grid.

FAST, RUN, XVM CLAIMS

Cominco Ltd.	Copper,Silver
700 - 409 Granville St.	76 M/11
Vancouver, B.C., V6C 1T2	67°36'N,111°11'W

REFERENCES

Jackson and others (in press); Seaton (1978); Seaton and Hurdle (1978); Tirrul and Bell (1980).

DIAND assessment report 081672.

PROPERTY

52 FAST claims.

RUN 1-10,12-18.

XVM 1-6,11-13,16,19-24.

LOCATION

The claims are 595 km north-northeasterly of Yellowknife to the east of the Anialik River (Fig. 8-17).

HISTORY

The RUN and XVM claims were recorded in September, 1974. The FAST claims were recorded in January of 1975. Also in 1975 airborne and ground geophysics, geological mapping and diamond drilling were carried out over the claims (Seaton, 1978; Seaton and Hurdle, 1978).

DESCRIPTION

The regional geology is shown in Figure 8-17. More recent work has been done by Tirrul and Bell (1980) at 1:50,000 and by Jackson and others (in press) at 1:18,520. In general, the southwestern part of the claims are underlain by mafic to intermediate volcanics; the eastern and central parts fragmental felsic volcanics and minor conglomerate and sandstone.

CURRENT WORK AND RESULTS

Work was undertaken on the RUN 1-10,12-15,17,18 and the XVM 2-6 claims in the spring of 1983. A UTEM electromagnetic survey was carried out over a grid of twenty-four lines, 1300 m long, at 50 m station intervals. Eight lines were surveyed at 25 m station intervals (Fig. 8-20). Three relatively shallow conductors were defined. The responses were poor to moderate, with no indications of better conductors at depth.

EOKUK INLIER

The Eokuk Inlier or Uplift (of Archean rocks) is flanked to east, west and south by Aphebian sediments and to the north by the waters of Coronation Gulf (Fig. 8-21). It is essentially composed of granitoid rocks, minor mafic intrusives and by gneissic granitoid rocks.

For properties explored see Table 8-1.

CENTRAL ("OLGA LAKE") VOLCANIC BELT AND LUPIN MINE AREA

The Central Volcanic Belt (Bostock, 1980) has been popularly known as the Olga Lake Belt for several years, the name deriving from the unofficial name of a lake centred at 65°27'30"N, 111°-50'00"W. Kidd Creek Mines (formerly Texasgulf Inc.) has maintained a base camp on the north shore of Olga Lake.

The Central Volcanic Belt (Fig. 8-22) is about 75 km long in a direct line from east to west, but measured along strike is much longer because it wraps around the Central Batholith, which indents the belt's southern margin.

A fault, which is on strike with the Norma Fault (Tremblay, 1976) of the Lupin Mine area (Figs. 8-22, 8-22a), trends northeasterly through much of the Central Volcanic Belt and passes through a point 10 km due north of Olga Lake.

The Lupin Mine area is largely underlain by metasediments of the Contwoyto Formation, which are intruded by the Contwoyto Batholith. The Contwoyto Formation metasediments of the Lupin Mine area are separated from the Central Volcanic Belt by a 3 km to 12 km wide belt of Itchen Formation metasediments.

The Gondor silver-zinc-copper deposit, which has been explored and diamond drilled by Kidd Creek Mines Ltd., is 9 km north-northeasterly of Olga Lake, in the central part of the Central Volcanic Belt.

Properties explored in 1982/1983 are listed below and in Table 8-1.

GONDOR, TAQ CLAIMS

Kidd Creek Mines Ltd.	Silver, Zinc, Copper
Box 175, Suite 5000	76 E/12
Commerce Court West	65°34'N, 111°49'W
Toronto, Ont., M5L 1E7	

REFERENCES

Bostock (1980); Craig and others (1960); Seaton (1981).

PROPERTIES

(1) NERAK	(7) CLIFF	(13) CON 1-4
(2) NERAK 2-5	(8) SEA	(14) MIKE 1,2
(3) WEST 2	(9) FIT 1,2	(15) GS 1-5
(4) FILL	(10) COAST	(16) GREEN 1,2
(5) EAST 1	(11) CHUK	(17) KIK
(6) BARB	(12) HILL 1,2	(18) FRAZ
		(19) WEST 1

As of Jan., 1985, properties 1-18 are owned by Westsun Petroleums and Minerals Ltd.; property 19 by G. Pin.

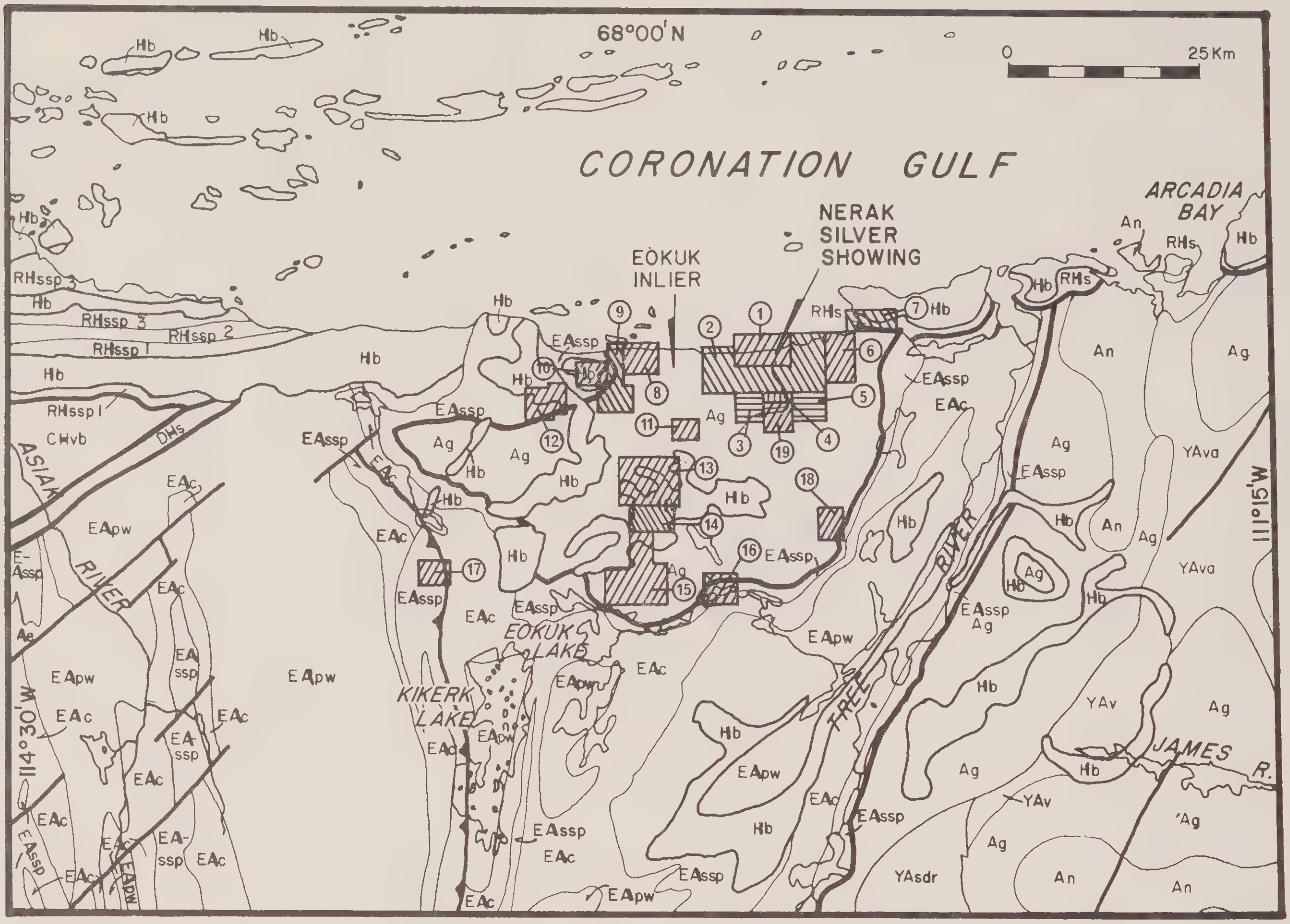


FIGURE 8-21: Eokuk Inlier. Kikerk Lake, Eokuk Lake and Tree River areas. Regional geology and properties. Regional geology by McGlynn (1977).

PROTEROZOIC

Hb — Gabbro sills and sheets. Includes Coronation and Franklin intrusions

RHssp3 — RAE GROUP
Shaly sandstone, siltstone, shale

RHssp2 — Red and green sandstone, mudstone

RHssp1 — Sandstone, siltstone, shale

RHs — Rae Group undivided

EPWORTH GROUP

EApw — Rocknest Fm: dolomite

EAc — Odjick Fm: sandstone, shale, mudstone

EAssp — RECLUSE FORMATION: argillite, shale, greywacke turbidites

COPPERMINE RIVER GROUP

CHvb — COPPER CREEK FORMATION: basaltic flows, minor sandstone

DISMAL LAKE GROUP

DHs — Dismal Lake Group undivided

ARCHEAN

Ag — Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided

An — Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks

YELLOWKNIFE SUPERGROUP

YAsdr — Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks

YAva — Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks

YAv — Volcanic rocks, undivided

DIAND assessment report 081696, 081676.

PROPERTY

GONDOR 1-8; TAQ 1-9.

LOCATION

The property (Figs. 8-22, 8-23) is centred 370 km north-northeasterly of Yellowknife and 10 km north of "Olga Lake". Kidd Creek's base camp was on the north shore of Olga Lake. The TAQ claims extend roughly 10 km southwesterly, 4 km northerly and 6.5 km easterly of the Gondor silver-base metal deposit (65°33'43"N, 111°48'00"W). TAQ 1 and 3 claims enclose GONDOR 1 to 8, which are smaller than the TAQ claims because they were staked under earlier Canada Mining Regulations.

HISTORY

In March, 1977, Noranda Exploration Company Ltd. staked GONDOR 1-8 to cover anomalies detected by a 1976 airborne EM and magnetometer survey. Ground follow-up by Noranda is summarized by Seaton (1981).

Airborne EM and magnetometer surveys have been flown over the Central Volcanic Belt (Bostock, 1980) by Noranda, Texasgulf Inc. (Kidd Creek Mines Ltd. since November of 1981) and Cominco Ltd. All three companies outlined anomalies over the Gondor deposit in the centre of the GONDOR claims.

Noranda and, later, Texasgulf who optioned the GONDOR claims along with five other Noranda properties in the Central Volcanic Belt in March of 1981, did ground geophysics as a follow-up to the airborne survey. Kidd Creek Mines outlined a strong residual gravity anomaly over the Gondor deposit which is also marked by a conductor flanked by a magnetic anomaly. Massive sulphide boulders were found near the deposit during prospecting of the GONDOR claims. From 1981 through 1983, Kidd Creek Mines drilled the Gondor deposit.

TAQ 1-3 were recorded in June of 1981 - TAQ 2 to the north of TAQ 1 and 3. TAQ 7, which lies east of TAQ 3 was added to the claim group in July of 1981. TAQ 4-6 and TAQ 8 and 9 were recorded in July and November of 1981. The sequence of staking reflects the acquisition of ground mainly along strike from and successively farther away from the Gondor stratabound volcanogenic massive sulphide deposit.

By staking the TAQ claims, Kidd Creek Mines consolidated their claims around the GONDOR group into a single block of TAQ, TEN and TET claims. The TEN and TET claims are described and work done on them summarized by Seaton (1981).

DESCRIPTION

The claims are in the central part of the Central or "Olga Lake" Volcanic Belt (Fig. 8-22). Olga Lake is the unofficial name of a 5-km-long by 4-km-wide lake centred at 65°27'30"N, 111°50'00"W on the southern margin of the volcanic belt. The regional geology has been mapped by Bostock (1980) at 1:250,000 scale, and earlier, at a reconnaissance scale of 1:506,880, by Craig and others (1960).

The GONDOR-TAQ-TEN-TET claim block is underlain by mafic and felsic volcanics of amphibolite facies.

CURRENT WORK AND RESULTS

In 1982, a grid (Fig. 8-23) with a 7.25-km-long northeasterly baseline and covering parts of TAQ 1,2,4,5,6,8 and 9 was geologically mapped and explored by VLF-EM and Crone surface pulse (DEEP-EM). One conductor that is of apparent bedrock source, and that is evidently formational, was delineated. It was previously detected by airborne EM. The geological survey, which included a compilation of the geology of both the TAQ and GONDOR claims, showed the TAQ claims to be underlain by mafic flows, mafic tuffs, fragmentals (including agglomerates), felsic and intermediate tuffs (including rhyolitic tuffs), quartz porphyry and clastic metasediments. The Gondor deposit is enclosed in a unit of felsic to intermediate tuffs and is in a northeasterly plunging Z-shaped fold. Younging direction in the supracrustal rocks is uncertain. A fault zone strikes northeasterly, sub-parallel to and 300 m to 800 m to the northwest of the TAQ baseline. The fault zone can be traced for about 30 km northeasterly to Fingers Lake near Lupin Mine and to a point about 15 km southwesterly of the GONDOR claims.

Anomalously high concentrations of gold were found in one sample from a quartz vein which cuts quartz porphyry.

In 1983, ground survey-controlled air photography was completed over the Gondor massive sulphide deposit and surrounding area. Twenty-three targets were established and accurately surveyed. Samples of drill core from the Gondor massive sulphide deposit were subjected to metallurgical tests mainly to determine flotation characteristics.

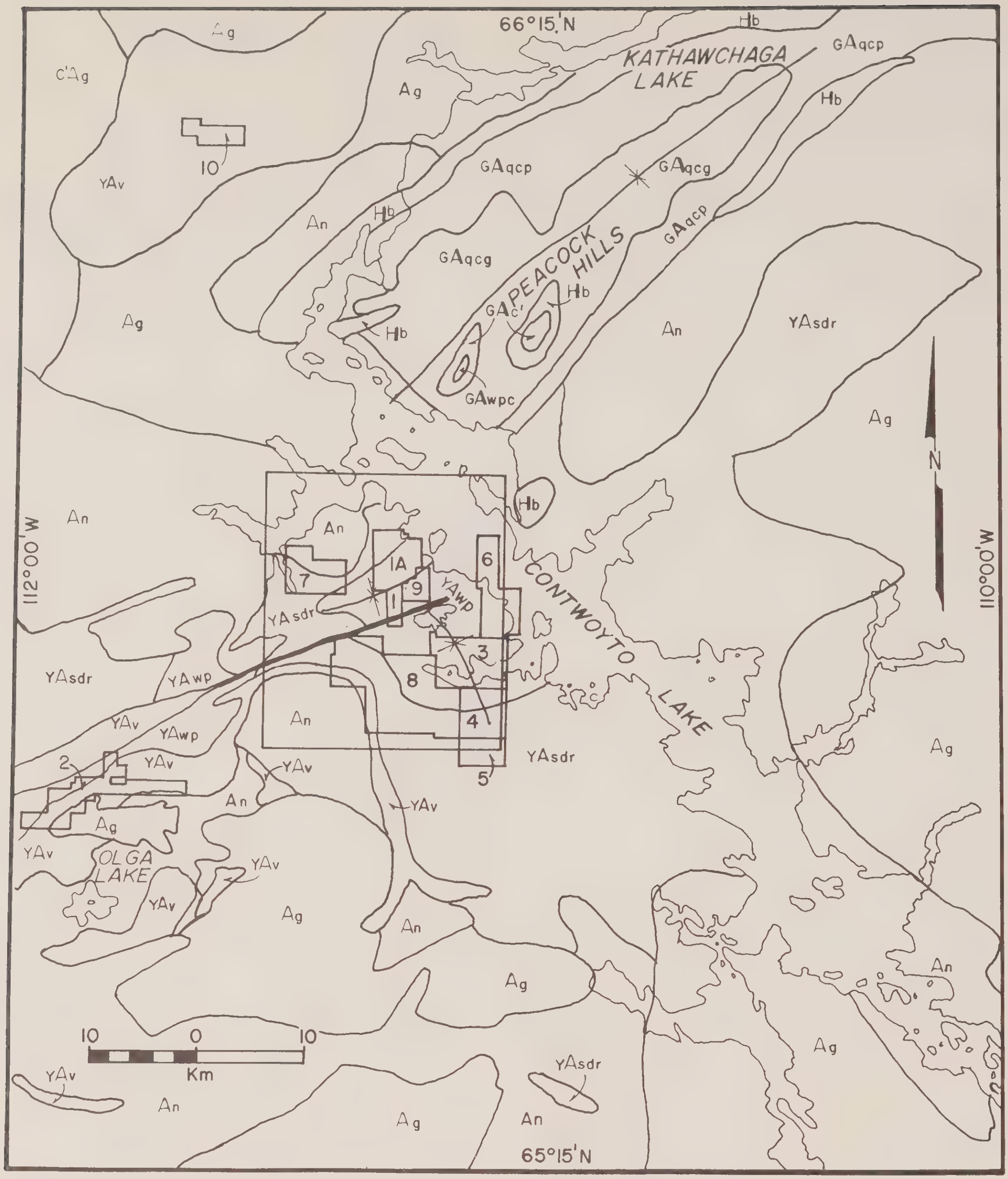


FIGURE 8-22: Regional geology and properties in the Central (Olga Lake) Volcanic Belt, Lupin Mine area, and the southwestern segment of the High Lake Supracrustal Belt. Geology from McGlynn (1977). Legend and property list on adjoining page.

AU 10,13,16,27 CLAIMS

Hemisphere Development Corp. — Gold
710 - 475 Howe St. — 76 E/10, 11
Vancouver, B.C., V6C 2B3 — $65^{o}40'30"N, 111^{o}04'W$

REFERENCES

Baragar and Hornbrook (1963); Bostock (1980); Schiller and Hornbrook (1964); Tremblay (1976). DIAND assessment reports 081739; 017167.

PROPERTY

AU 10,13,16,27.

LOCATION

The claims are 395 km northeasterly of Yellowknife, and include most of Shallow Bay on the west side of Contwoyto Lake (Figs. 8-22, 8-22a).

PROPERTIES

for Figures 8-22 and 8-22a

CENTRAL VOLCANIC BELT AND LUPIN MINE AREA

(1) DER claims

(1A) Lupin Mine lease

(2) GONDOR, TAQ claims

(3) AU 10, 13, 16, 27

(4) AU 14, 17

(5) AU 15

(6) OP claims

(7) AU 2, 3

(8) BARB, AU 4, 5, 7, 11, KAP, MINER claims

(9) FIN claims

SW SEGMENT OF HIGH LAKE SUPRACRUSTAL BELT

(10) BO claims

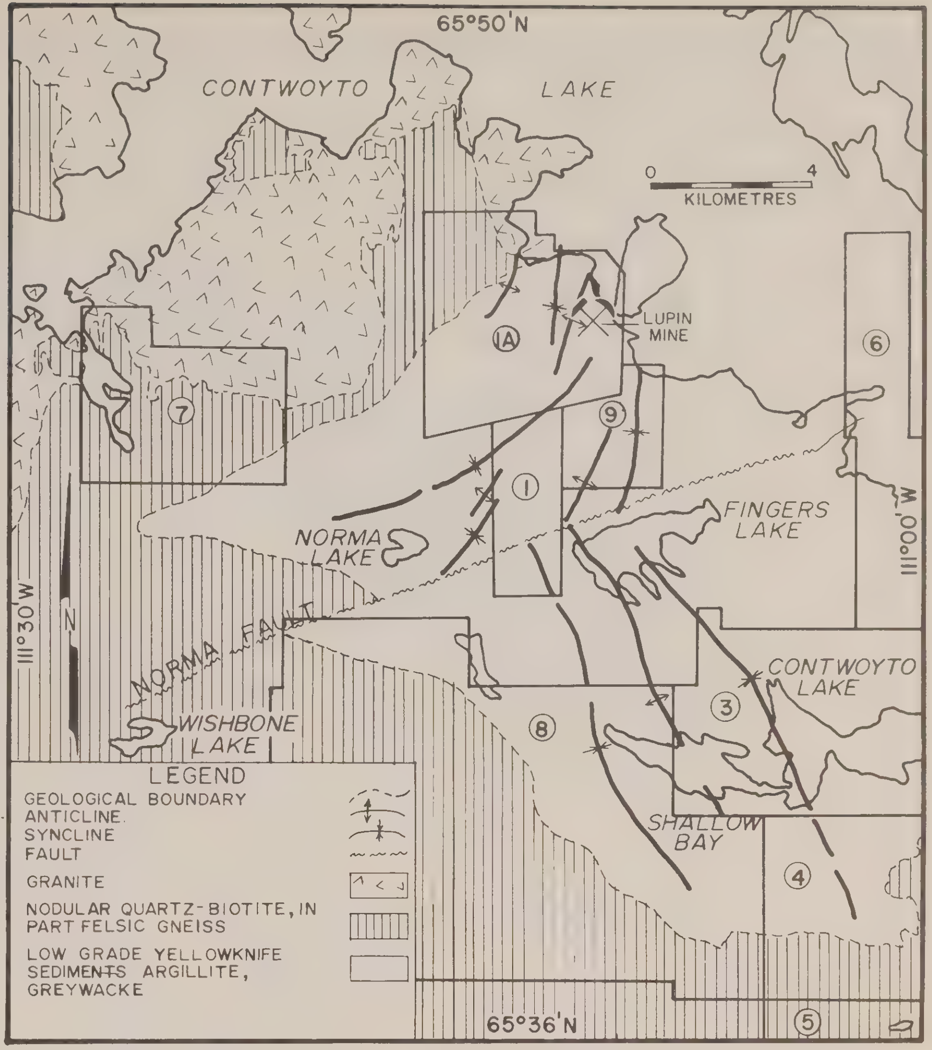


FIGURE 8-22a: Inset of Lupin Mine area. Property numbers are the same as for Figure 8-22.

LEGEND FOR FIGURE 8-22

PROTEROZOIC

Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions
	GOULBURN GROUP
GAwpc	Peacock Hills Fm: mudstone, greywacke, turbidites, dolomite
GAc	Kuuvik Fm: dolomite, stromatolitic dolomite
GAqcg	Burnside River Fm: subarkose, quartzite, quartz pebble conglomerate, mudstone, arenaceous dolomite
GAqcp	Western River Fm: quartzite, mudstone, siltstone, arenaceous and stromatolitic dolomite, quartz pebble conglomerate

ARCHEAN

Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks
C'An C'Ag	Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup
	YELLOWKNIFE SUPERGROUP
YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAv	Volcanic rocks, undivided

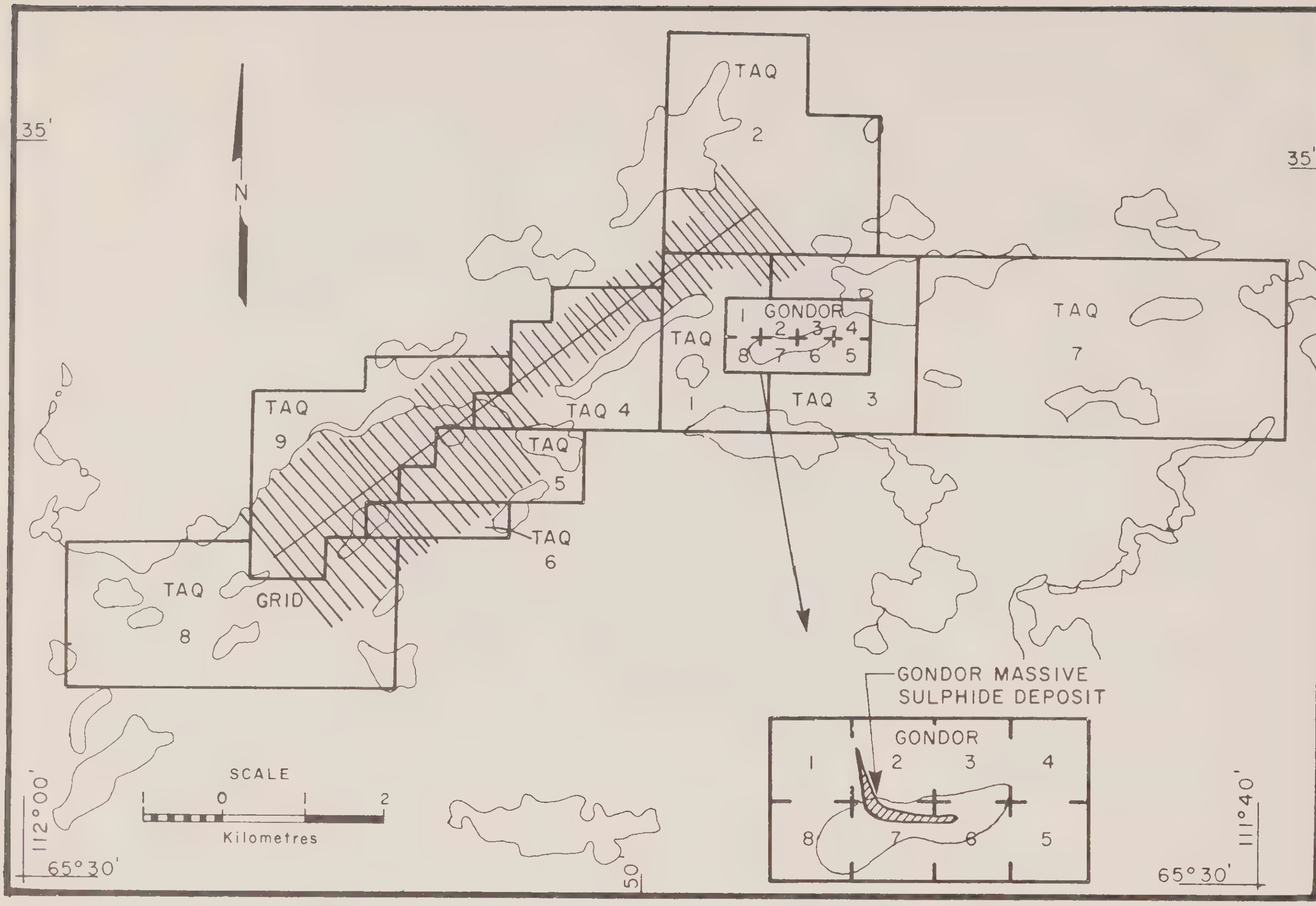


FIGURE 8-23: GONDOR and TAQ claims. Claims, grid and Gondor massive sulphide deposit locations.

HISTORY

Gold was first discovered in the area in 1960 by the Canadian Nickel Company Ltd. In 1961, the BAY claim group was staked by the Earl-Jacks Syndicate and covered what is now AU 27 and AU 10. Also in 1961, Falconbridge Nickel Mines Ltd. optioned the BOX and FOX claims, among others, from Conwest Exploration Company Ltd. These claims covered part of the present AU 13 and AU 16 claims. The eastern half of the AU 16 claim was originally Prospecting Permit 76-E-10, granted to Canadian Nickel Company Ltd. in 1962 (DIAND assessment report 017167). By 1973, all had lapsed. Baragar and Hornbrook (1963), Schiller and Hornbrook (1964) and Tremblay (1976) cover the history and work done on these properties between 1962 and 1964.

The present claims were recorded in February, 1981. They were placed under option to Bow Valley Industries Ltd. in May, 1984.

DESCRIPTION

Figures 8-22 and 8-22a show the regional geology of the area. Bostock (1980) and Tremblay (1976) have mapped the area at 1:250,000 and 1:50,000 respectively.

CURRENT WORK AND RESULTS

VLF-EM and magnetometer surveys were carried out over four grids (H-1 to H-4) in the 1983 field season. All grids except H-3 were geologically mapped at a scale of 1:2,000 (Fig. 8-24).

Numerous layers and lenses of iron formation were found interbedded with argillaceous greywackes. Associated with the iron formations are pyrite, pyrrhotite and arsenopyrite (grids H-2 and H-4). Grab

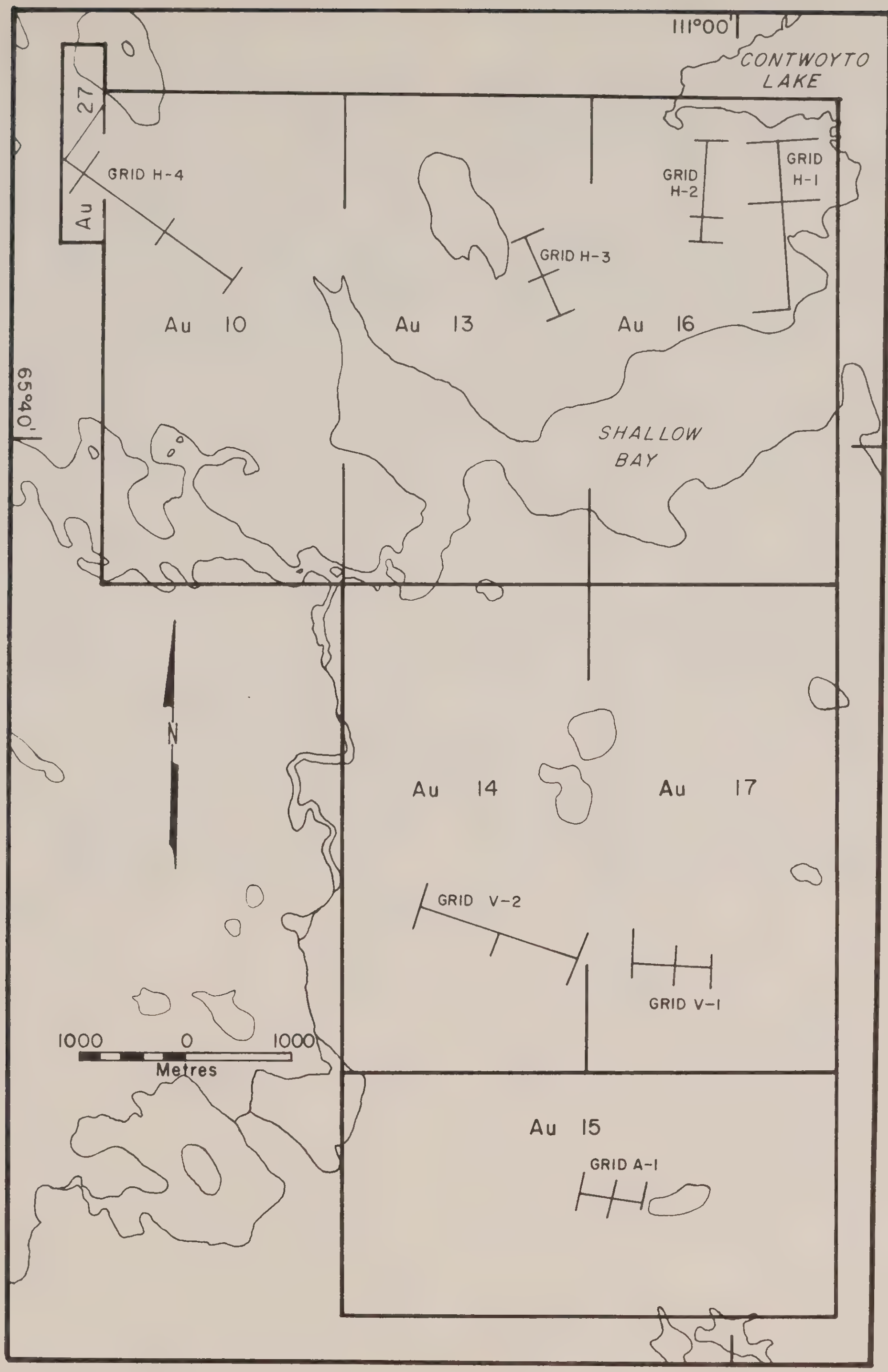


FIGURE 8-24: The AU 10, 13, 16, 27; AU 14, 17; and AU 15 claims and grids.

samples of the iron formations assayed 0.3 g/tonne Au for grid H-1, 0.206 to 6.446 g/tonne Au for grid H-2, and 0.343 to 1.916 g/tonne for grid H-4.

The VLF-EM surveys revealed several weak to moderate conductors, some of which correspond to known iron formations; others appear to be extensions of iron formations.

Positive or negative magnetic anomalies were found to be caused by diabase dykes or iron formations. The magnetic lows were attributed to polarity reversal of magnetite or pyrrhotite.

AU 14,17 CLAIMS

Viscount Resources Ltd.	Gold
710 - 475 Howe St.	76 E/10, 11
Vancouver, B.C., V6C 2B3	65°38'N,111°01°W

REFERENCES

Bostock (1980); Schiller (1965); Tremblay (1976).
DIAND assessment reports 081737; 017167.

PROPERTY

AU 14,17.

LOCATION

The claims are 390 km northeasterly of Yellowknife, 3 km south of Shallow Bay on the west side of Contwoyto Lake (Figs. 8-22, 8-22a).

HISTORY

The AU 14,17 claims cover ground previously staked as part of the PEG 1-36 and JUDY 1-18 claims that were held by Giant Yellowknife Mines in 1962. In 1963, these claims lapsed.

In 1962, Permit Area 33 (later P.P. 76-E-10) was granted to Canadian Nickel Company Ltd. and covered what is now the eastern part of AU 17. Geological mapping and geophysics were carried out from 1962 to 1964, when the claims lapsed (DIAND assessment report 017167; Schiller, 1965).

The claims were recorded in February, 1981 and were placed under option to Bow Valley Industries Ltd. in May, 1984.

DESCRIPTION

The regional geology is shown in Figures 8-22 and 8-22a. The area around the claim has also been mapped by Tremblay (1976) at 1:50,000 and in part by Bostock (1980) at 1:250,000.

CURRENT WORK AND RESULTS

In the summer of 1983, two grids, V-1 and V-2, were set up on the claims (Fig. 8-24). Reconnaissance and detailed mapping and geophysical surveys were carried out over each grid.

Numerous iron formations interbedded with argillaceous metasediments were mapped, as well as the greenschist/amphibolite facies metamorphic isograd trending northeasterly across the AU 17 claim. Samples of the iron formations assayed less than 1 g/tonne Au.

VLF-EM and magnetic surveys were undertaken. The weak to moderate conductors detected by the VLF-EM survey are believed to be indicative of diabase dykes, as are the main positive magnetic anomalies. The iron formations showed varying magnetic responses and no anomalous response to the VLF-EM, thereby indicating that sulphide mineralization is discontinuous.

AU 15 CLAIM

Amhawk Resources Corp.	Gold
809 - 837 West Hastings St.	76 E/10, 11
Vancouver, B.C., V6C 1B6	65°36'N,111°01'W

REFERENCES

Bostock (1980); Tremblay (1976).
DIAND assessment report 081735.

PROPERTY

AU 15.

LOCATION

The claim is 390 km northeasterly of Yellowknife, south of Shallow Bay in the Contwoyto Lake area (Figs. 8-22, 8-22a).

HISTORY

Gold was first discovered in the area in 1960 by Canadian Nickel Company Limited. In 1961 a staking rush occurred and many claims were staked around the Canadian Nickel property by numerous companies. Roberts Mining Company Ltd. staked the DUD, FUZZ, FRY, MOR and HAR claims (a total of 99 claims) in the area of the present AU 15 claim.

Most of the work done on the claims was carried out in 1963 when prospecting, mapping, trenching and a magnetic survey were done. Gold assays averaging 3.4 to 5.1 g/tonne, with a maximum of 56.1 g/tonne Au were reported. By 1973 the claims had lapsed. A more detailed history of the claims and surrounding

area is given by Tremblay (1976).

The AU 15 claim was recorded in February, 1981.

DESCRIPTION

The regional geology is shown in Figures 8-22 and 8-22a. The area has been mapped at 1:250,000 by Bostock (1980) and by Tremblay (1976) at 1:50,000.

CURRENT WORK AND RESULTS

In the summer of 1983, a grid (Grid A-1) was set up to cover the area where gold was reported in 1963 (Fig. 8-24). The grid area was geologically mapped at 1:2,000 and grab samples assayed for gold, but results were discouraging. Numerous iron formations were found in the grid area with varying grades of gold and sulphide mineralization.

VLF-EM and magnetometer surveys were also carried out over the grid. The magnetometer survey indicated that the iron formations were weakly to non-magnetic and were often indicated by magnetic lows. The VLF-EM survey did not reveal any significant conductors.

OP CLAIMS

O.P. Resources Ltd.	Gold
P.O. Box 2045	76 E/10,11,14,15
Yellowknife, N.W.T., X1A 2P5	$65^{o}44'$N,$111^{o}00'$W

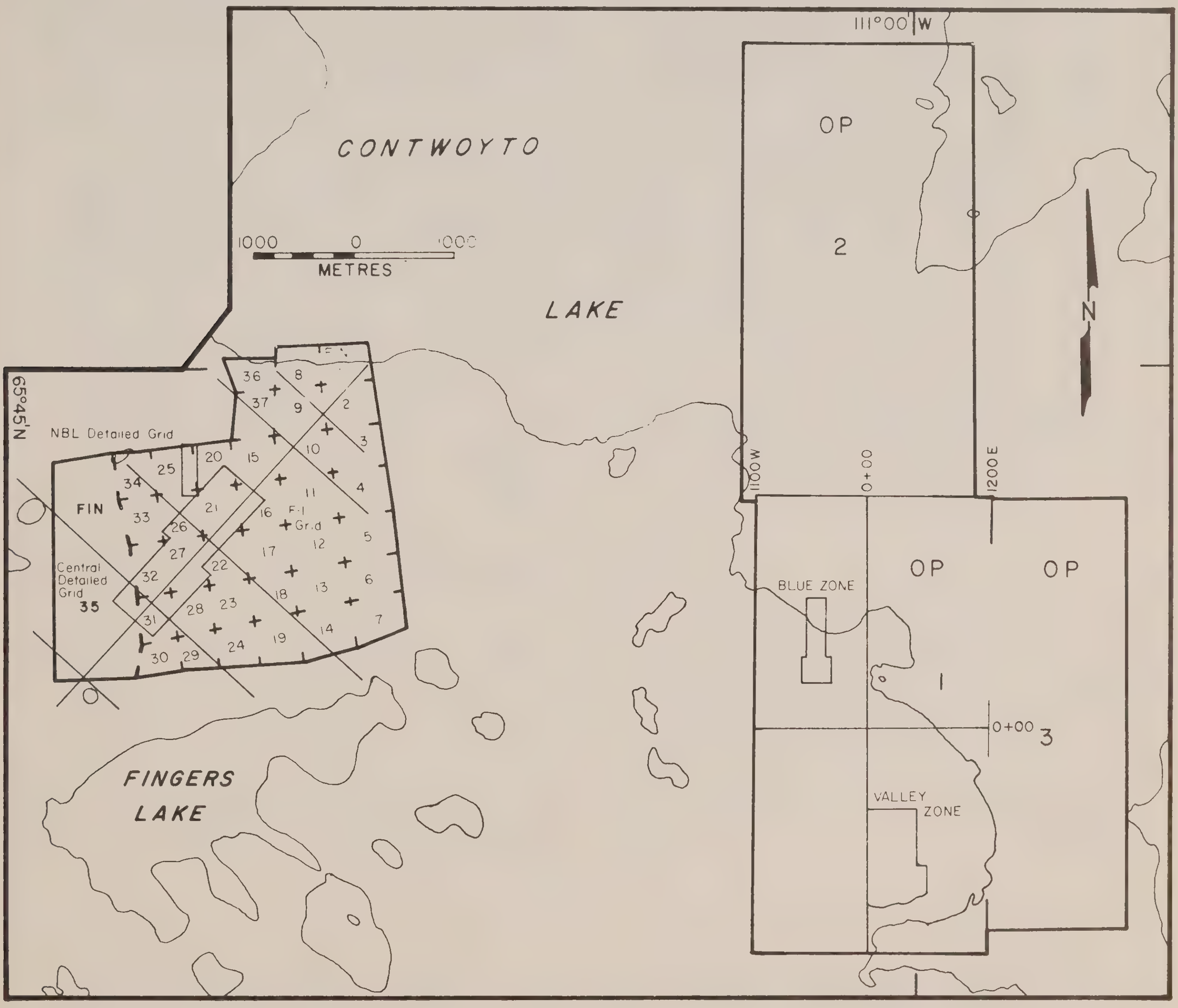


FIGURE 8-25: The OP and FIN claims and grid locations.

REFERENCES

Baragar and Hornbrook (1963); Bostock (1980); Fraser (1964); Seaton (1984); Tremblay (1976).

DIAND assessment reports 081758, 017167, 017132.

PROPERTY

OP 1-3.

LOCATION

The claims are 400 km northeasterly of Yellowknife, and cover part of the southwestern shore of Contwoyto Lake (Figs. 8-22, 8-22a).

HISTORY

The OP claims cover an area originally staked as the BOX claims by Conwest Exploration Company Ltd. in 1961. These claims were subsequently optioned to Falconbridge Nickel Mines Ltd., who explored them between 1961 and 1963. Auriferous iron formation found in the central part of the claims was reported to have a maximum concentration of 5.5 g/t Au over 1.13 m (Seaton, 1984; Baragar and Hornbrook, 1963). The OP 2 and OP 3 claims partly cover lapsed Prospecting Permits 76-E-10 (P.P. 33) and 76-E-15 (P.P. 35) granted to Canadian Nickel Company Ltd. in 1962. These areas were explored from 1962 to 1964 (DIAND assessment reports 017162, 017167).

In January of 1980, the IGOR 1 claim was recorded by M. Magrum for Oxen Engineering Ltd. It was then transferred to O.P. Resources who changed the name to OP 1. The OP 2, 3 claims were recorded for O.P. Resources in July of 1983.

DESCRIPTION

The regional geology is shown in Figures 8-22 and 8-22a. The area is predominantly underlain by Archean metagreywacke with iron formation lenses. Geological maps by Tremblay (1976) and Bostock (1980) cover the western portion of the claims at 1:50,000 and 1:250,000 respectively. East of longitude 111°00W, the area has only been mapped at 1:506,880 scale by Fraser (1964).

CURRENT WORK AND RESULTS

The work conducted in 1983 was on the OP 1 claim. A grid was set up over the entire claim (Fig. 8-25) and geological mapping, prospecting and geophysics undertaken. Areas of interest were then tested by geological, magnetometer, VLF-EM, and self-potential (S.P.) surveys. Selected VLF conductors were surveyed with horizontal loop EM. Geophysical readings were taken at 25 and 12.5-m intervals along the lines of the main grid and at 10 and 5-m intervals on the detailed grids. Four zones were tested: the Main, West, Blue and Valley zones, most of which were explored in the 1960's by Falconbridge. The Main and West zones exhibit weak to moderate VLF conductors, with moderate to strong S.P. response and a variable positive magnetic response. The Blue and Valley zones have strong VLF, horizontal loop and S.P. responses, mainly caused by graphite and sulphides. Magnetic conductors are weak to absent.

Diamond drilling (4 holes) tested two of the zones with a total of 314.3 m. Samples taken from the drill core and outcrop revealed varying concentrations of gold.

AU 2,3 CLAIMS

Great Bear Development Corp.	Gold
710 - 475 Howe St.	76 E/11, 14
Vancouver, B.C., V6C 2B3	65°44'30"N,111°24'W

REFERENCES

Baragar and Hornbrook (1963); Bostock (1980); Tremblay (1976).

DIAND assessment report 081740.

PROPERTY

AU 2,3.

LOCATION

The claims are 395 km northeasterly of Yellowknife in the vicinity of Sun Bay on Contwoyto Lake (Figs. 8-22, 8-22a).

HISTORY

The Canadian Nickel Company Ltd. first discovered gold in the area in 1960. In 1961, a staking rush took place and most of the area was staked. The AU 2,3 claims were originally staked as a number of smaller claims by various companies. The northern, western and central part of the claims were staked as the PAT claims (Giant Yellowknife Mines) and the ESKIMO, WHITE and SUN claims (Eskimo Syndicate). To the south were the Earl-Jack Syndicate's JE claims and the Big Four Syndicate's SP claims. The eastern part of the AU 2,3 claims were originally part of the RY (Big Four), BL (Earl-Jack), and MOP (Canadian Nickel) claims (Baragar and Hornbrook, 1963; Tremblay, 1976). Much of the work done on the claims

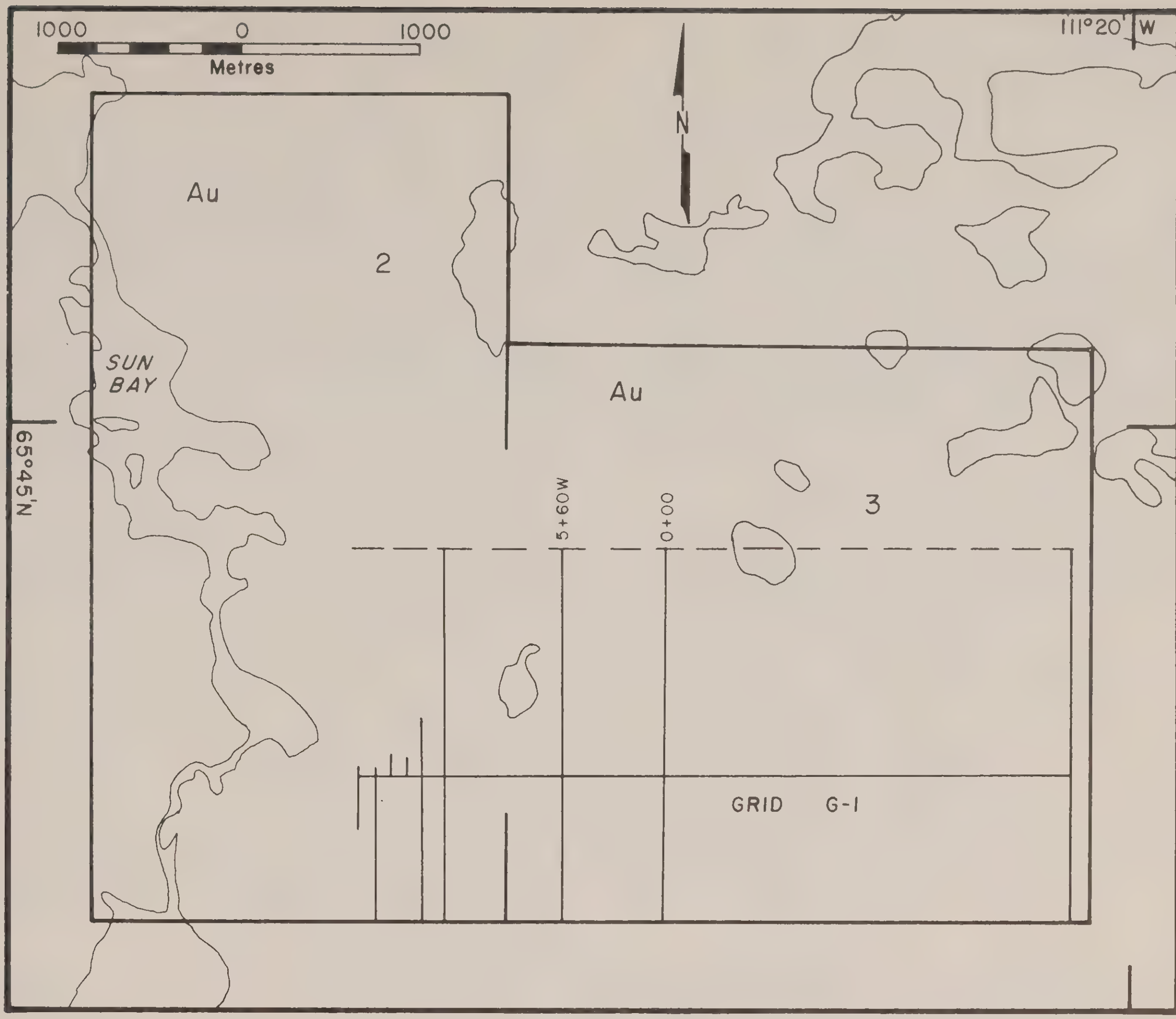


FIGURE 8-26: The AU 2,3 claims and Grid G-1.

was carried out between 1962 and 1964. By 1973, most of the claims had lapsed.

The present claims were recorded in February, 1981, and are now under option to Bow Valley Industries Ltd.

DESCRIPTION

The regional geology is shown in Figures 8-22 and 8-22a. Bostock (1980) and Tremblay (1976) have also mapped the area at 1:250,000 and 1:50,000 respectively.

CURRENT WORK AND RESULTS

In the fall of 1983, a grid (G-1) 4 km long and averaging 2.1 km wide was set up over the claims (Fig. 8-26). Side lines were spaced 80 m apart. Dip angle VLF-EM, total field magnetometer, and magnetic gradient surveys, as well as geological mapping were then carried out over the grid.

The VLF-EM survey delineated several weak to moderately strong conductors, many of which were coincident with positive easterly trending magnetic anomalies and spot magnetic highs. Many of the VLF and magnetic anomalies were associated with silicate-facies iron formation. The magnetic gradient survey indicated most of the iron formations with negative gradients.

Several iron formations intercalated with silty to argillaceous greywackes were mapped. The iron formations are spotted with sulphide minerals; the most common sulphide being pyrite. Fifteen grab samples of the iron formations were assayed for gold with the highest result being 0.240 g/tonne.

AU, BARB, KAP, MINER CLAIMS

Bow Valley Industries Ltd.
P.O. Box 6610, Postal Stn "D"
1800 - 321, 6th Ave., S.W.
Calgary, Alta., T2P 3R2

Gold
76 E/11
$65^{o}40'$N,$111^{o}12'$W

REFERENCES

Baragar and Hornbrook (1963); Bostock (1980); Schiller and Hornbrook (1964); Seaton (1978); Tremblay (1976).

DIAND assessment report 081738, 080271, 017231, 017211, 017205, 017203, 017201, 017200, 017132, 017104 to 017106.

PROPERTY

AU 4,5,7,11; BARB 1; KAP 1-3; MINER.

LOCATION

The claims lie 390 km north-northeasterly of Yellowknife and west of Shallow Bay, Contwoyto Lake (Figs. 8-22, 8-22a).

HISTORY

Gold discoveries in the area in 1960 by the Canadian Nickel Company Ltd. resulted in a staking rush in 1961. Table 8-5 summarizes part of the history of the ground now covered by AU, BARB, KAP and MINER claims.

Most of these claims lapsed by 1973. Further references to the work done in the 1960's are Baragar and Hornbrook (1963), Schiller and Hornbrook (1964), and Tremblay (1976).

The PAN claims (now BARB 1) were re-staked in 1974 by N.J. Byrne and optioned to Precambrian Shield Resources Ltd. and Numac Oil and Gas Ltd. In 1976, the option was dropped and the claim returned to N. Byrne (Seaton, 1978).

TABLE 8-5: PREVIOUS WORK ON GROUND NOW HELD AS THE AU, BARB, KAP AND MINER CLAIMS

PRESENT CLAIM	OLD CLAIM	COMPANY NAME	WORK DONE	ASSESSMENT REPORT
AU 4	BAR group	Big Four Syndicate	1962,63 - geology, geophysics, diamond drilling.	017203, 017205.
	FOX claims	Conwest Exploration, optioned to Falconbridge Nickel Co. Ltd.	1961 to 1964 - geology, geophysics.	017211, 017231.
AU 5	NAT claims	New Athona Mines Ltd.	1962,63 - magnetometer, diamond drilling.	017105-6
	BAR 7,14,15,22	Big Four Syndicate	See above - AU 4	017203,5
AU 7	BAY group	Earl Jack Syndicate	1962 - geology, diamond drilling, geophysics.	017104
	ACE claims	Precambrian Mining Services Ltd.	1963 - geology	017201
AU 11	FUZ, MOR	Roberts Mining Co. Ltd.	1963 - geology	017132
BARB 1	ACE claims	Precambrian Mining	1963 - geology	017201
	NAT claims	New Athona Mines	See above - AU 5	017105-6
	PAN claims	Precambrian Mining	1963 - geology	017201
	PAN claims	Precambrian Shield Resources Ltd.	1975 - detailed magnetometer.	080271
KAP 1	NAT claims	New Athona Mines Ltd.	See above - AU 5	017105-6
	FRY claims	Roberts Mining Co. Ltd.	1963 - geology	017132
KAP 2,3	ROB claims	Roberts Mining Co. Ltd.	1963 - geology	017132
MINER	NAT claims	New Athona Mines Ltd.	See above - AU 5	017106
	BAR group	Big Four Syndicate	See above - AU 4	017203,5
	NOR group	North Goldcrest Mines Ltd.	1962 - geology	017200

The BARB 1 claim was recorded by P. Hungle in December, 1980 and transferred to Barren Lands Exploration Services Ltd. in February, 1981. It was then transferred to Highwood Resources Ltd. in January, 1983. In February of 1981, the AU 4,5,7,11 claims were recorded for Highwood Resources Ltd. Both the BARB and AU claims were transferred to Kappa Resources Ltd. in February of 1983, and then to Bow Valley Industries in April, 1984.

The KAP 1,3 and KAP 2, MINER claims were recorded by P. McKay and F. Diamond'C respectively in March, 1983, and transferred to Bow Valley Industries in April of 1984.

DESCRIPTION

The regional geology of the claims is shown in Figures 8-22 and 8-22a. Bostock (1980) and Tremblay (1976) have mapped the area at 1:250,000 and 1:50,000 respectively.

CURRENT WORK AND RESULTS

Work carried out over the claims in 1983 has been tabulated in Table 8-6. The work comprised geological mapping, diamond drilling and a variety of geophysical surveys on grids, shown on Figure 8-27. On the claims, gold appears to be associated with pyrite, pyrrhotite and locally arsenopyrite in silicate-facies iron formation.

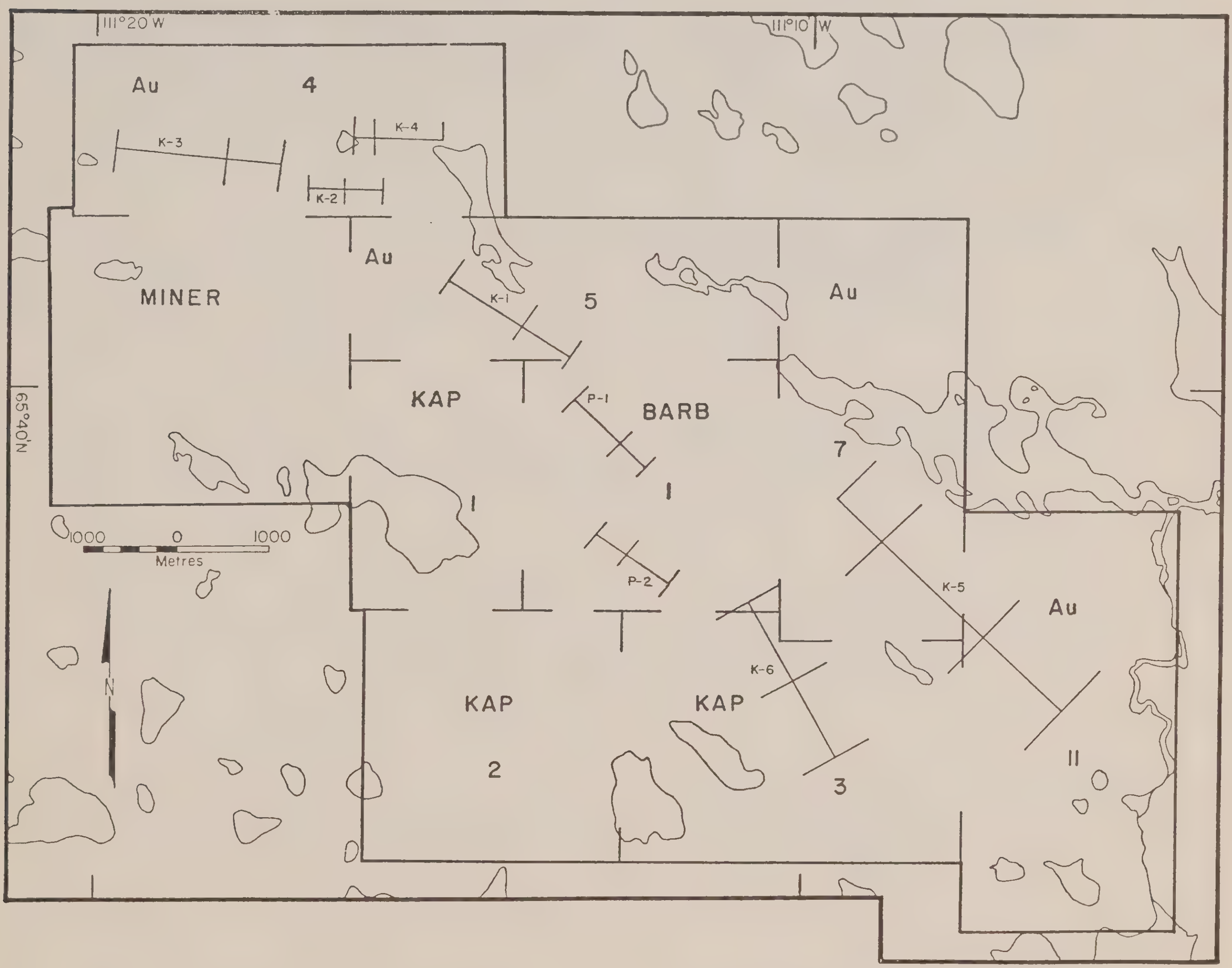


FIGURE 8-27: The AU, BARB, KAP and MINER claims and grids.

TABLE 8-6: AU, BARB, KAP, MINER CLAIMS - WORK DONE IN 1983

GRID	CLAIM	GEOLOGY	MAGNETIC SURVEYS	VLF-EM
P-1 (covers 1963 Pan Showing, PAN Claims)	BARB 1	1:1000; NW trending sediments interbedded with silicate facies Fe formation. A small syenite stock intrudes central part of claim.	Pan Showing - Series of weak magnetic lows and highs.	Pan Showing - no conductor. Another zone of iron formation indicated by moderately strong linear high.
P-2	BARB 1	1:1000; silicate facies iron formation occurring as pendants or xenoliths within syenite.	Outlines syenite/sediment contact. Three zones of complex dipoles and magnetic highs representing iron formation pendants. Two zones show no corresponding VLF response.	One strong conductor due to surface conductivity. One weak conductor coincident with complex anomalous magnetic response associated with the iron formation.
K-1 (covers No. 2 Showing 1962 PAN Claims)	AU 5	1:2000; two parallel layers easterly trending of Fe formation interbedded with greywacke and argillite.	One zone of magnetic high corresponding with iron formation.	Four weak conductors - 3 due to overburden. The fourth due to silicate facies iron formation.
K-2	AU 4	1:2000; sediments interbedded with thin discontinuous layers of iron formation.	Relatively flat response.	No conductors revealed.
K-3	AU 4	1:2000; similar to K-1 and K-2. Three layers of iron formation.	Weak to moderately strong discontinuous anomalies attributable to Fe formation.	Weak discontinuous conductors associated with iron formations.
K-4	AU 4	1:2000; similar to K-3; 3 zones of silicate facies iron formation. One zone also contains oxide facies.	Oxide facies exhibits strong positive magnetic response. Central iron formation represented by complex dipoles and weak magnetic highs.	Weak to very weak response for central and southern iron formations.
K-5	AU 7,11 KAP 3	1:2000; silty to argillaceous sediments with layers and lenses of Fe formation. Eight to 10 exposed Fe formations.	Iron formations show spot magnetic highs and negative gradient anomalies.	One strong conductor due to pyrite in mineralized Fe formation.
K-6	KAP 3	1:2000; greywackes, interbedded with narrow continuous Fe formation layers. Three zones, 1 rich in sulphides.	Iron formations - weak positive magnetic response close to strong magnetic response of diabase dyke.	Weak to strong conductors indicative of the sulphide bearing iron formation.

SELF POTENTIAL	DIAMOND DRILLING	MINERALIZATION
Large negative anomaly corresponds to VLF anomaly. Pan Showing - negative anomaly over northern half.	Three holes for a total of 217.39 m. Encountered varying gold concentrations.	1963 results returned 8.4 g/t Au over Pan Showing. Present results show varying concentrations of Au; best gold results associated with banded pyrrhotite and minor arsenopyrite phenocrysts.
		Nine grab samples from northwestern part of grid revealing varying concentrations of gold. Associated with pyrrhotite, pyrite and minor arsenopyrite in iron formation.
Weak negative response corresponding with VLF conductor.	One hole 77.13 m to test VLF conductor; intersected 2 weakly mineralized iron formation layers.	Surface sampling 0.274 g/t and 0.137 g/t Au. Subsurface 0.342 g/t Au. Gold associated with disseminated pyrite and pyrrhotite.
		One zone of mineralized iron formation. Six grab samples revealing varying gold concentrations associated with pyrrhotite, pyrite and arsenopyrite.
		Au is associated with pyrrhotite, pyrite-bearing iron formation. One Fe formation rich in arsenopyrite. Varying gold concentrations in excess of 1 g/t Au.
		Central and southern iron formations associated with disseminated pyrite, pyrrhotite with varying Au concentrations.
		Sulphides light to sparse, locally concentrated. Usually pyrite, pyrrhotite, locally arsenopyrite, chalcopyrite. Most of iron formation contains little or no sulphides. Grab sampling revealed nil to 2.806 g/t Au.
		Varying gold concentrations, associated with pyrrhotite, pyrite and locally, arsenopyrite.

FIN CLAIMS

Aber Resources Ltd.	Gold
675 West Hastings St.	76 E/11
Vancouver, B.C., V6B 1N2	$65^{0}44'$N,$111^{0}10'$W

REFERENCES

Bostock (1980); Gibbins and others (1977); Seaton (1984); Tremblay (1976).

DIAND assessment reports 081745, 081319, 080159.

PROPERTY

FIN 1-36.

LOCATION

The claims are 400 km north-northeasterly of Yellowknife and south of the Lupin Mine site (Figs. 8-22, 8-22a).

HISTORY

The FIN 1-34 claims were staked in July and August of 1974 by Canadian Superior Exploration Ltd. over ground originally staked as the FOX claims by Conwest Exploration Company Ltd. and subsequently optioned to Falconbridge Nickel Mines Ltd. (Gibbins and others, 1977; Tremblay, 1976). Ground magnetometer and self potential surveys were carried out over the claims in 1974, and diamond drilling in 1981 (Seaton, 1984; DIAND assessment reports 080159, 081319). In 1982, Aber Resources Ltd. purchased FIN 1-34. These were then optioned to Bow Valley Industries Ltd. in April, 1983. FIN 35, 36 were recorded in August of 1983, and placed under option to Bow Valley Industries in July of 1984.

DESCRIPTION

Figures 8-22 and 8-22a show the regional geology of the claims. The FIN claims are underlain predominantly by Archean metasediments with iron formation lenses and minor rhyolitic and andesitic rocks. Maps have also been compiled by Bostock (1980) and Tremblay (1976) at 1:250,000 and 1:50,000 respectively.

CURRENT WORK AND RESULTS

In the summer of 1983, a grid (Fig. 8-25) was set up over the FIN 1-36 claims and detailed geology, magnetometer, and VLF-EM surveys conducted. Additional detailed magnetometer, VLF-EM, and self-potential (S.P.) surveys and diamond drilling (256.4 m) were then undertaken.

The geological and geophysical surveys, compiled at 1:2000 scale, revealed five areas requiring more work. Detailed geophysics on these areas outlined numerous VLF conductors coincident with magnetic anomalies and silicate-facies iron formations. Some of these anomalies were tested by drilling. Four holes were drilled. Subsurface pyrrhotite-bearing silicate-facies iron formation was intersected in three holes. Strong S.P. anomalies are apparently caused by graphite.

Grab sample assays of iron formation taken during geological mapping of the area assayed from a trace to 1.711 g/t Au. Iron formations cut in one hole gave various gold assays.

HOOD RIVER-TAKIJUQ LAKE SUPRACRUSTAL BELT

This belt, part of which is shown in Figure 8-28, was referred to in the 1975 Mineral Industry Report as the Hawk Lake Belt, which included at its southern end the Takijuq South Segment. Hawk Lake is the unofficial name of a small lake 20 km south of the Hood River. Noranda explored the HAWK and other claims from a camp at Hawk Lake in 1975 (Seaton, 1978).

In the 1980-1981 Mineral Industry Report the Hawk Lake Belt has been renamed the Hood River-Takijuq Lake Supracrustal Belt, to avoid the use of an unofficial name related to now lapsed claims. The name "Hood River Belt" is not used because this has been popularly used by exploration personnel to refer to the southern (76L) part of the High Lake Supracrustal Belt. The spelling "Takijuq Lake" is taken from the Gazetteer of Canada. Takijua Lake has been referred to in various publications as Takijuk and Takiyuak Lake. For consistency of spelling, that part of the belt near the south end of Takijuq Lake is here referred to as the Takijuq - not Takijuk - South Segment.

Most of the Hood River-Takijuq Lake Supracrustal Belt is composed of mafic volcanics, but in the Takijuq South Segment, felsic and intermediate volcanics underlie an 8 km long by 1.5 km wide area south of Amoogabooga Lake (unofficial name coined by Kidd Creek Mines), a 7 km-long east-northeasterly trending lake centred at $64^{0}04'45''$N, 112^{0}-$34'30''$W. Weakly argentiferous zinc-copper deposits outcrop near Amoogabooga Lake.

The Hood River-Takijuq Lake Supracrustal Belt is about 125 km long and from 2 km to 16 km wide. It is widest at the Takijuq South Segment, which adjoins

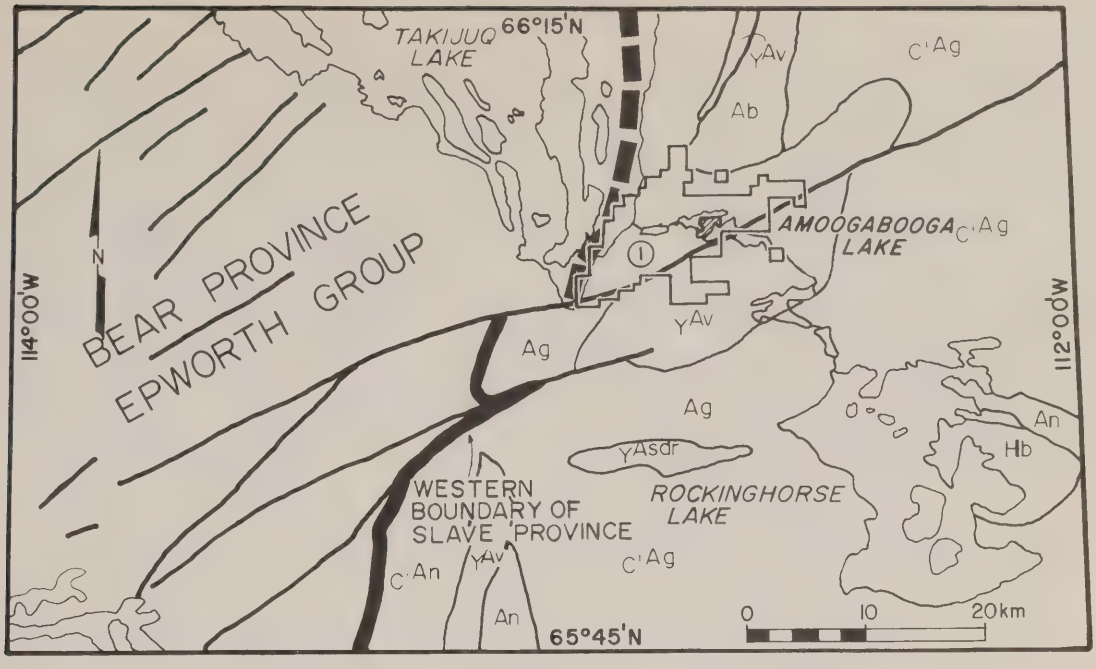


FIGURE 8-28: Regional geology and properties for part of the Hood River-Takijuq Lake Supracrustal Belt. Geology from McGlynn (1977).

LEGEND FOR FIGURE 8-28

PROTEROZOIC

Hb	Gabbro sills and sheets. Includes Coronation and Franklin intrusions

ARCHEAN

C'An C'Ag	Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup
Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks
Ab	Gabbro, anorthosite, diorite and minor ultramafic rocks

YELLOWKNIFE SUPERGROUP

YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAv	Volcanic rocks, undivided

PROPERTIES

(1) HOOD, HOOD A, HOOD B, HOOD C claims

Area drilled

Segment trends mainly east-northeasterly; the remainder of the Hood River-Takijuq Lake Belt trends N23^{o}E.

At its northern end the Hood River-Takijuq Lake Supracrustal Belt is within a few kilometres of the southern end of the Anialik River Supracrustal Belt. The southwestern end of the Takijuq South Segment is about 10 km northeasterly of the northern end of the Point Lake Supracrustal Belt.

For work done on the Hood River-Takijuq Lake Supracrustal Belt, see Table 8-1.

POINT LAKE SUPRACRUSTAL BELT

This belt, part of which is shown in Figure 8-29, extends from roughly 30 km south of Point Lake to 10 km south of Takijuq Lake. It trends northerly to slightly east of north; is roughly 100 km long and; except at its ends, is from 2 km to 8 km wide. The Point Lake Supracrustal Belt is continuous with the Point Lake-Providence Lake-Newbigging Lake-Thoolezzeh Lake Supracrustal Belt, which diverges easterly from the Point Lake Supracrustal Belt at Point Lake to follow an arcuate southerly course from 65^{o}15'N to roughly 64^{o}00'N.

The Point Lake Supracrustal Belt is here defined

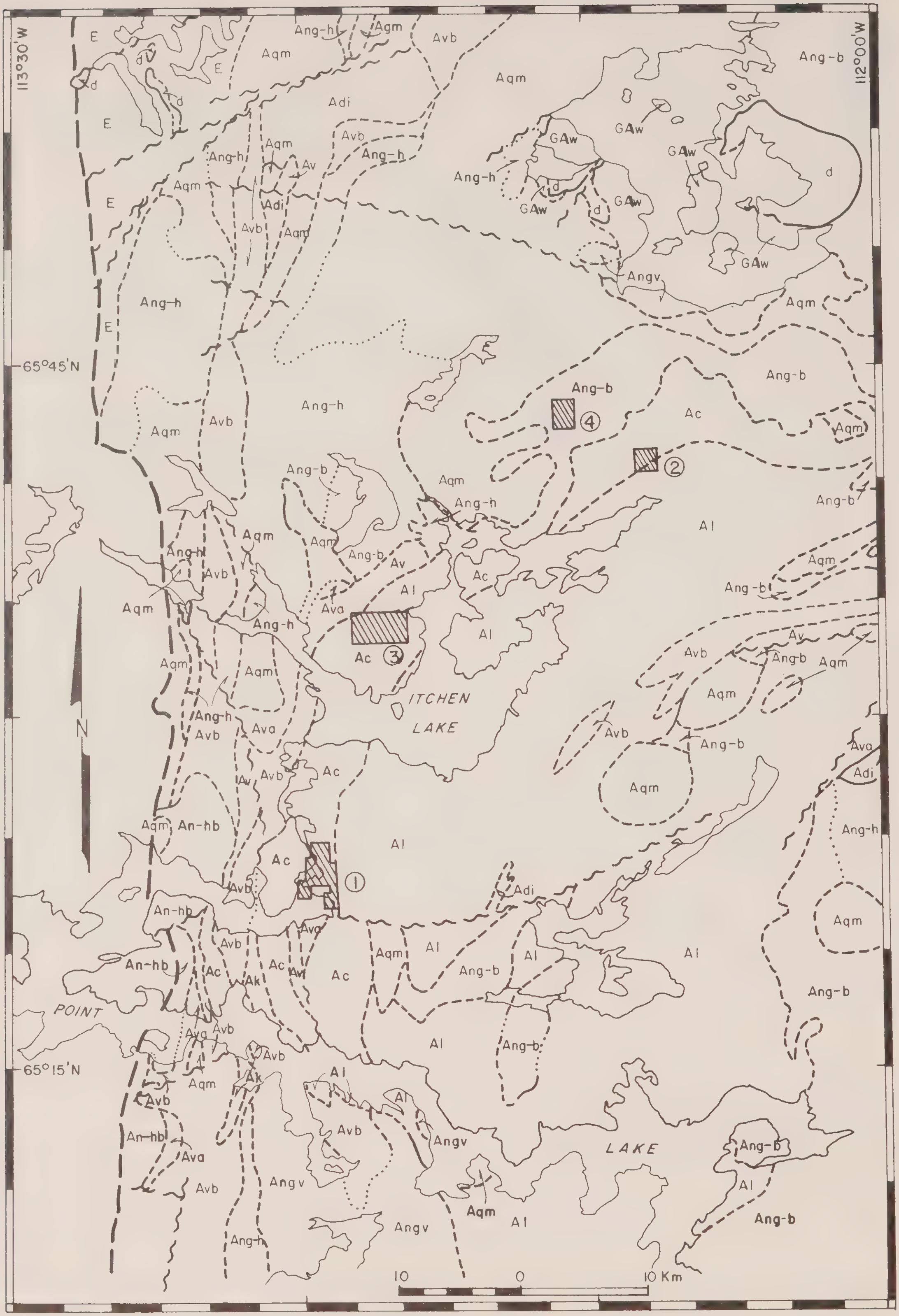


FIGURE 8-29: Regional geology and properties in the Point Lake Supracrustal Belt. Geology modified after Bostock (1980).

PROTEROZOIC

Symbol	Description
d	Diabase, gabbro: dykes and sills
E	Epworth Group: sandstone, limestone, argillite, siltstone, quartzite, greywacke, stromatolitic dolomite
GAw	Goulburn Group: Western River Fm - argillite, greywacke, quartzite, siltstone

ARCHEAN

LATE KENORAN PLUTONIC ROCKS

Symbol	Description
Aqm	Quartz-monzonite, granodiorite; some granite
Adi	Diorite, granodiorite; some amphibolite

YELLOWKNIFE SUPERGROUP

Symbol	Description
AI	Itchen Fm: metaturbidites lacking iron formation lenses - greywacke, argillite, slate, nodular schists and gneisses
Ak	Keskarrah Fm: metavolcanic fanglomerate-conglomerate, subgreywacke
Ac	Contwoyto Fm: metaturbidites containing iron formation lenses - argillite, siltstone, slate, greywacke

EARLY KENORAN (?) PLUTONIC ROCKS

Symbol	Description
Avb	Point Lake Fm: metavolcanic and related metasedimentary rocks - mafic flows, tuffs, black slate
Av	Mixed felsic to mafic tuffs, some amphibolite, hornblende gneiss, and calc-silicate rocks
Ava	Felsic flows and tuffs

HYBRID ROCKS

Symbol	Description
An-hb	Banded to foliated biotite, hornblende gneisses
Ang-b	Lit-par-lit gneiss and schist, mostly biotite-rich
Angv	Felsic and/or mafic volcanic and hypabyssal rocks
Ang-h	Dioritic agmatic, mafic volcanic rocks

PROPERTIES

1. REN claims
2. SIK claims
3. CUB 1
4. SKI claims

as the Western Volcanic Belt of Bostock (1980), together with the area underlain by metasediments of the Contwoyto Formation that flank the volcanics to the east. The Contwoyto Formation is overlain by metasediments of the Itchen Formation, which fill a basin that lies between the Western Volcanic Belt, the Rockinghorse Batholith, the Central (Olga Lake) Volcanic Belt and Batholith, the Yamba Batholith and some smaller batholiths and plutons.

The Point Lake Supracrustal Belt includes, in ascending stratigraphic sequence, mainly mafic volcanics of the Point Lake Formation, conglomerates of the Keskarrah Formation, and metaturbidites of the Contwoyto Formation. The Contwoyto Formation hosts iron formation lenses that are locally auriferous.

The Keskarrah Formation does not extend north of the northern arm of Point Lake. It contains clasts derived both from pre-Yellowknife Supergroup basement and from the Point Lake Formation. In places the Keskarrah Formation rests unconformably on basement rocks, elsewhere it overlies and interfingers with the Point Lake Formation. The contact between the Contwoyto and Itchen Formations is not clearly defined. If the iron formation lenses in the Contwoyto Formation have a volcanic source, and if the source volcanics are restricted to the basin margins - as appears to be commonly the case - the Itchen Formation, which contains no iron formation, would appear to be a distal facies of the Contwoyto Formation. Calcareous argillite, present in the

Contwoyto Formation but absent in the more widespread Itchen Formation, may likewise have derived its calcareous component from either contemporaneous vulcanism or from nearby mafic volcanics of the Point Lake Formation. Elsewhere in the Slave Province, as near the Hackett River Volcanic Belt and the Back River Volcanic Complex, the volcanics are commonly fringed by calcareous rock units and iron formation.

For properties explored see Table 8-1.

RUSSELL LAKE-INDIN LAKE SUPRACRUSTAL BELT

The Indin Lake Supracrustal Belt (Figs. 8-30, 8-30a) is a sinuous belt of metavolcanics and metasediments, near the western margin of the Slave Province. Indin Lake is roughly 75 km north of the southern end of the belt.

An "isthmus" of metasediments joins the Indin Lake Supracrustal Belt with the Russell Lake Belt to the south (Fig. 8-30). 1982/83 exploration work in this area is detailed below and in Table 8-1.

BON CLAIMS

Noranda Exploration Co. Ltd.	Gold
4 - 2130 Notre Dame Ave.	85 J/13
Winnipeg, Man., R3H OK1	$62^{0}54'30"N,115^{0}54'W$

REFERENCES

Henderson (1976).

DIAND assessment report 081694; Energy, Mines and Resources (EMR) Mineral Inventory File.

PROPERTY

BON 1-4.

LOCATION

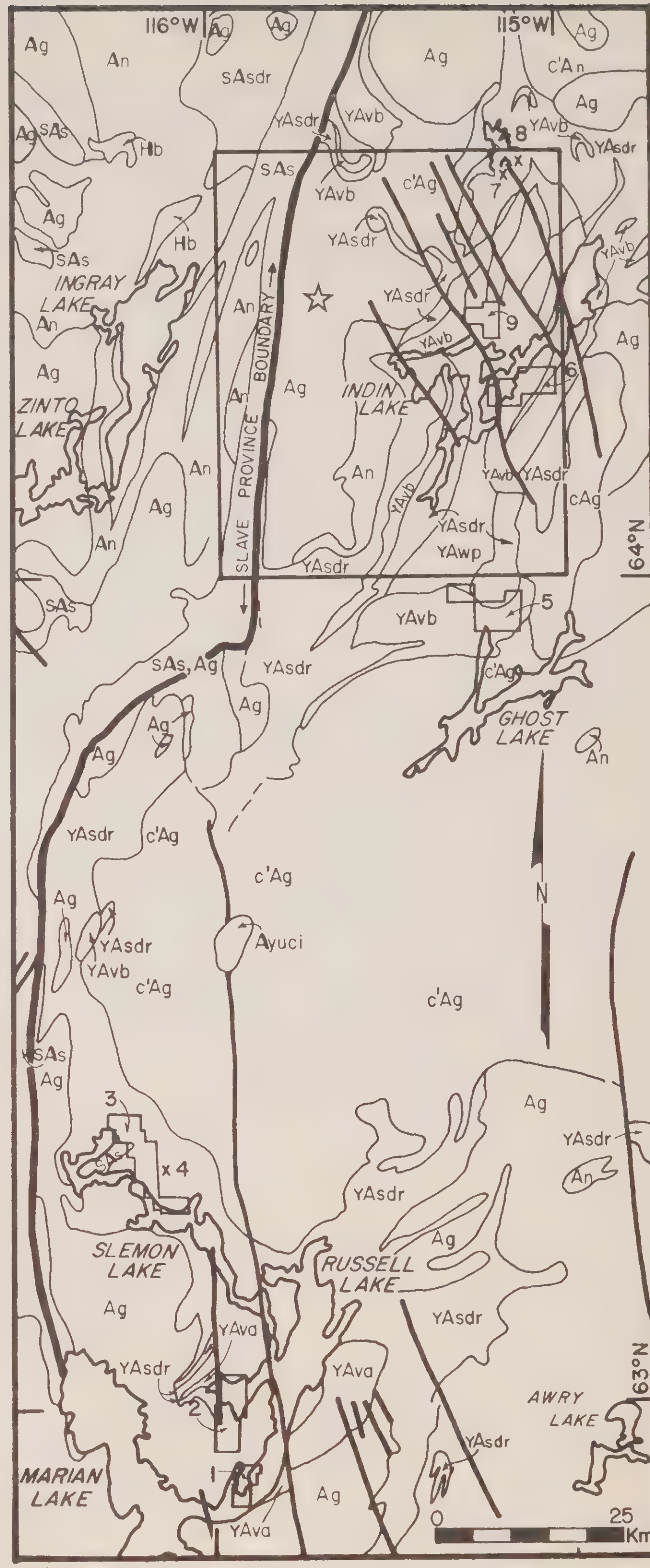
The claims are 95 km west-northwesterly of Yellowknife on a peninsula on the west side of Russell Lake (Fig. 8-30).

HISTORY

The BON claims were recorded in September of 1981 and are part of what was originally the SEVENORE claims. The SEVENORE claims were staked in 1945, and prospected and trenched in 1946.

DESCRIPTION

Figure 8-30 shows the regional geology of the area. A compilation of the area at 1:125,000 has also been done by Henderson (1976).



☆ See Fig. 8-30a

FIGURE 8-30: Regional geology and properties in the Russell Lake - Indin Lake Supracrustal Belt. Geology from McGlynn (1977).

LEGEND FOR FIGURES 8-30 AND 8-30a

Hb — Gabbro sills and sheets. Includes Coronation and Franklin intrusions

HEPBURN METAMORPHIC-PLUTONIC BELT

Ag — Granodiorite, quartz monzonite, granite

An — Migmatite, veined gneiss, granitic gneiss. Includes undifferentiated metamorphosed Snare or Epworth rocks

SNARE GROUP

SAs — Siltstone, shale, quartzite, dolomite, minor intermediate volcanics

SAsdr — Metamorphosed Snare rocks

Ayuci — Nepheline syenite, carbonatite. May be younger than some Aphebian sedimentary sequences. Temporal relationship unknown

ARCHEAN

An' — Mixed gneisses and granodiorite of probable Archean age in the Bear Structural Province

C'An C'Ag — Migmatite, granitic gneisses or granitic rocks that may be in part older than Yellowknife Supergroup

Ag — Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided

An — Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks

YELLOWKNIFE SUPERGROUP

YAsdr — Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks

YAwp — Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff

YAva — Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks

YAvb — Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks

CAg — Complex of plutonic gneisses, commonly of tonalite composition, in part cataclastic, that are basement to Yellowknife Supergroup. May include some younger plutonic rocks

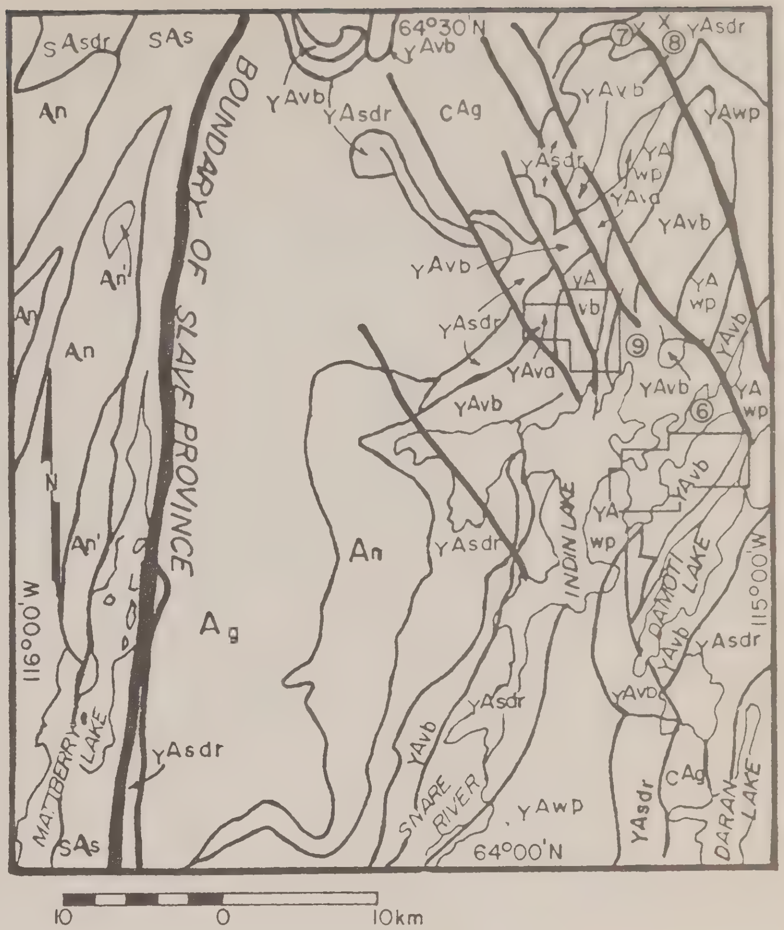


FIGURE 8-30a: Inset of Indin Lake Supracrustal Belt. Property numbers and geological symbols are the same as those for Figure 8-30.

PROPERTIES

(1) BON claims	(5) WIJ, INN, EDI claims
(2) BET, RUSS claims	(6) BETAM 1 - 4
(3) JEAN, LEMON, LEMONAID claims	(7) DAN 9
(4) DON 3, 4	(8) EAEC
	(9) KIM 4, 5

CURRENT WORK AND RESULTS

In 1982, the claims were explored by geological mapping, prospecting, and geophysics. The BON claims are underlain by Archean metasedimentary rocks, in particular, cordierite-bearing metagreywacke which hosts northerly striking carbonate-pyrite-bearing exhalite. Six samples, most from carbonate-pyrite-bearing exhalite, were taken and analyzed for gold, with results ranging from less than 10 to 156 ppb Au.

The geophysics surveys were set out over a grid (Fig. 8-31) with station intervals of 25 m. VLF-EM

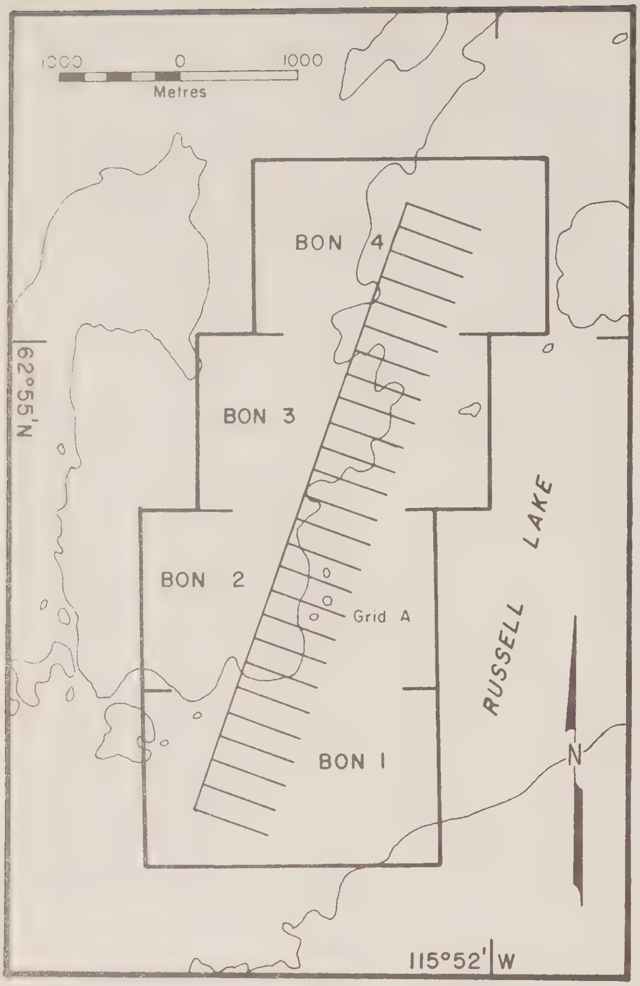


FIGURE 8-31: BON claims and Grid A.

and magnetometer surveys were carried out. Three magnetic anomalies were indicated in the central area of the grid.

BET, RUSS CLAIMS

Noranda Exploration Co. Ltd.	Gold
4 - 2130 Notre Dame Ave.	85 J/13; 85 O/4
Winnipeg, Man., R3H OK1	62°59'30"N,115°57'W

REFERENCES

Henderson (1976); Lord (1942).

DIAND assessment report 081633; Energy, Mines and Resources (EMR) Mineral Inventory File.

PROPERTY

BET 1-7.

RUSS 1,2.

LOCATION

The claim is 100 km northwesterly of Yellowknife on the west side of Russell Lake (Fig. 8-30).

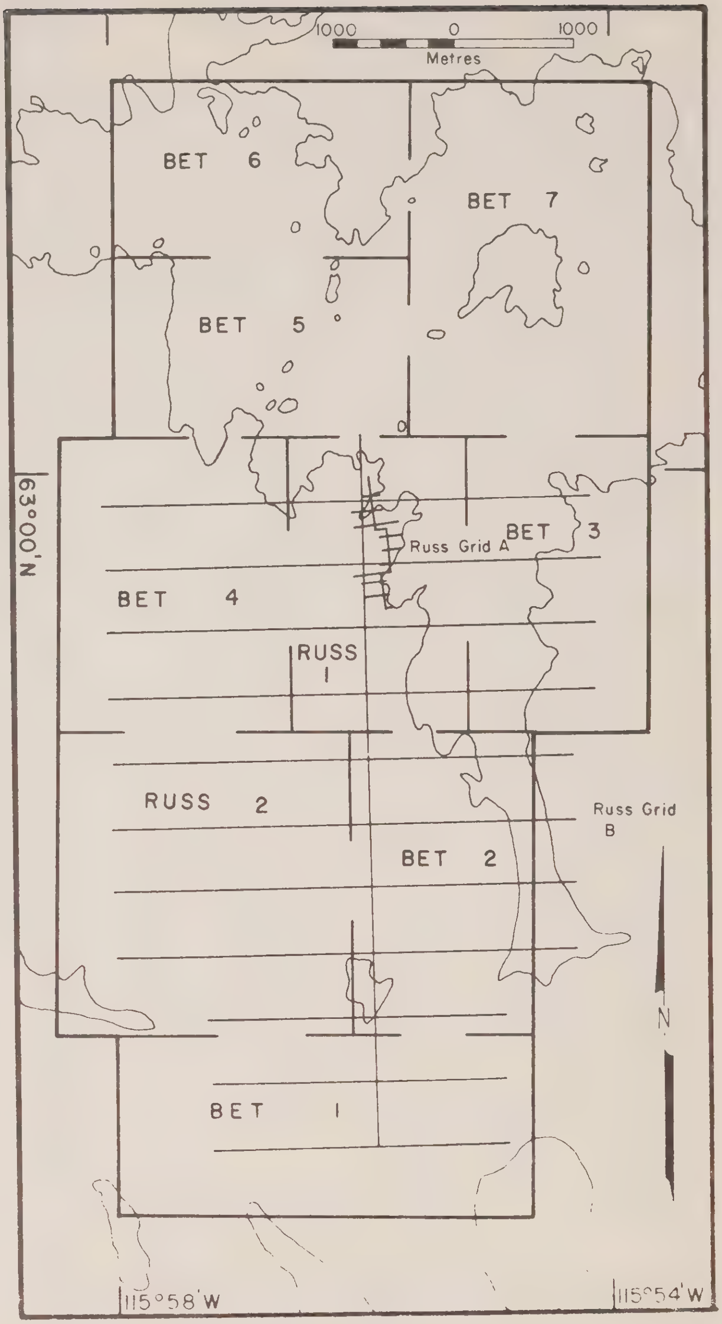


FIGURE 8-32: BET and RUSS claims and grids.

HISTORY

The property was originally part of the SEVENORE 1-12 claim group staked in 1945 upon the discovery of gold there by K. Murray. In 1946 the claims were acquired by Fort Rae Gold Mines Limited. Bear Exploration and Radium Limited, under a stock purchase agreement with Fort Rae Gold Mines, explored a gold showing known as the "Sevenore stock". (EMR Mineral Inventory File).

The property was re-staked later as the EKK claims. These claims lapsed and were then re-staked

as TIP 1-28 by Kerr Addison Mines Ltd.

The RUSS 1,2 claims were recorded for Noranda in May of 1981. The BET 1-7 claims were recorded in September of 1981.

DESCRIPTION

Figure 8-30 shows the regional geology of the area. The southern part of the claim group is within the area covered by Henderson's (1976) 1:125,000 geological map. The northern part of the claims are in the area mapped by Lord (1942) at 253,440.

CURRENT WORK AND RESULTS

In 1981 and 1982 exploration work was carried out over the RUSS and BET claims. Work comprised geological mapping, prospecting, sampling, magnetometer and VLF-EM surveys.

The claims are underlain by metagreywackes and banded iron formations intruded by numerous granodiorite (the Sevenore stock) and quartz monzonite intrusions. Sampling confirmed the presence of gold in fractures and quartz veins of the Sevenore stock. A total of 94 samples were taken and analyzed for gold, silver, copper, lead and zinc. Gold is also concentrated in iron formation adjacent to the stock.

Two magnetometer surveys were carried out in 1981 and 1982. A detailed survey of RUSS Grid A evaluated the Sevenore stock showing in 1981. A reconnaissance survey of the RUSS Grid B, in 1982, explored the RUSS 1,2 and BET 1-4 claims (Fig. 8-32). The magnetometer surveys outlined magnetic highs over the iron formations, which are probably caused by magnetite, and a low over the Sevenore stock.

A VLF-EM survey in 1982 provided inconclusive results.

JEAN, LEMON, LEMONAID CLAIMS

Noranda Exploration Co. Ltd.	Gold
4 - 2130 Notre Dame Ave.	85 N/1,8
Winnipeg, Man., R3H OK1	$63^{0}17'N, 116^{0}08'W$

REFERENCES

Lord (1942, 1951); Padgham and others (1976).
DIAND assessment report 081634.

PROPERTY

JEAN 1-5, LEMON, LEMONAID.

LOCATION

The claims are 130 km northwesterly of

TABLE 8-7: SUMMARY OF THE HISTORY OF GROUND NOW HELD AS THE JEAN, LEMON, LEMONAID CLAIMS

COMPANY NAME	CLAIM	YEAR	REFERENCE	PRESENT CLAIM
J. Lundmark; W. Lahti	AU 5,6,13,24	1939	Lord, 1951 Old claim maps.	JEAN Group
Frederick Yellowknife Gold Mines Ltd.	RO 17,18	1945	"	"
Slemon Yellowknife Gold Mines Ltd.	bought RO and AU claims	1945	"	"
"	JOE 1-6, GUS 4-6, PEG 4, FAYE 1-11, JOHNNY 1, CHER 1-5, PIN 1,4, DON Group, PINCHER FRACTION	1946	"	JEAN Group, LEMONAID
Snare River Exploration Company Ltd.	SR Group	1946	Lord, 1951	LEMON
Slemon Yellowknife Gold Mines Ltd.	DON Group?	1946?	Old claim maps	"
?	ALP Group, previously SR	?	Claim Index	"
Anglo United Development Corp.	SAP 1-6, previously ALP, lapsed in 1976.	1972	Padgham and others (1976)	"

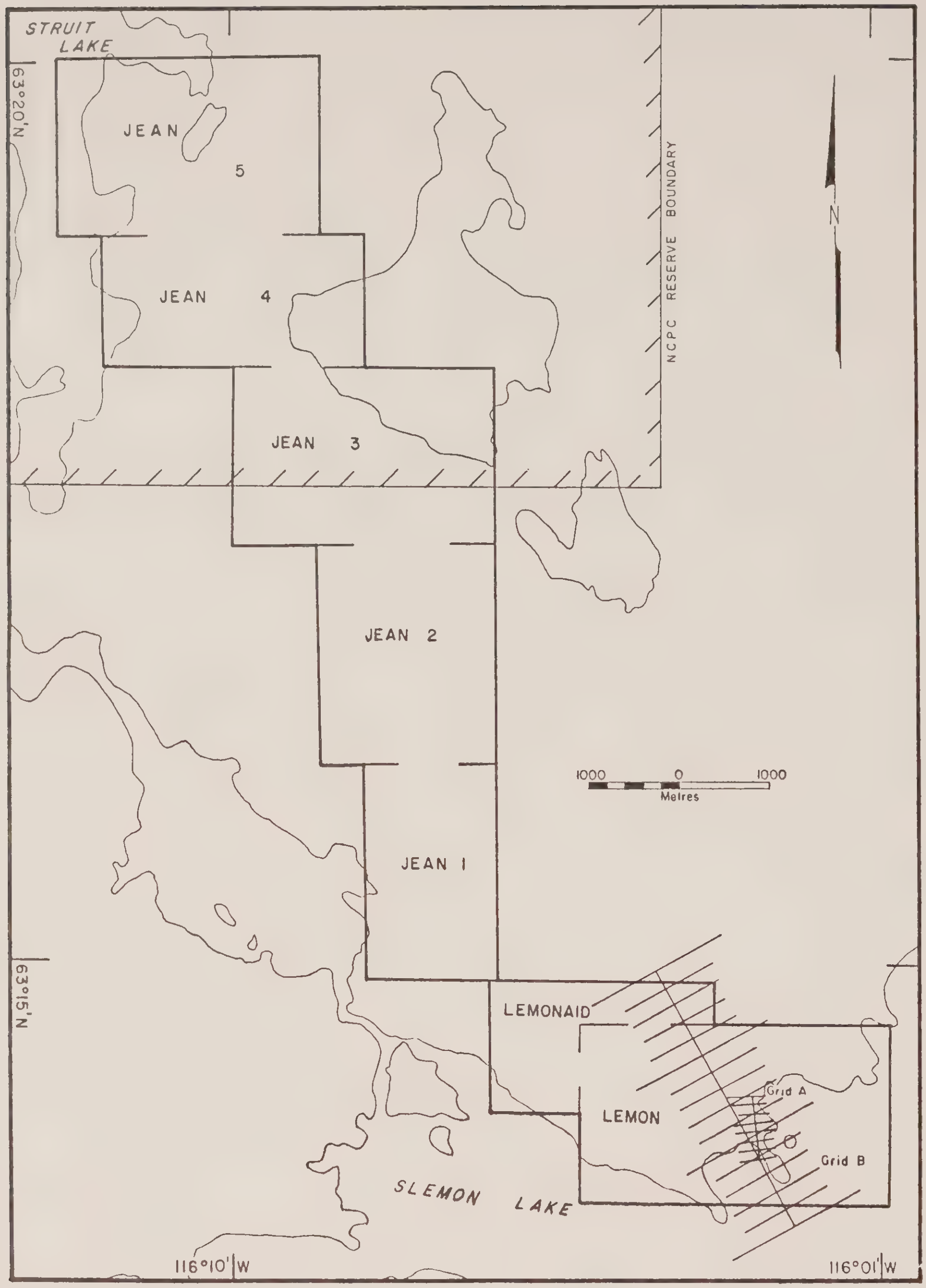


FIGURE 8-33: JEAN, LEMON and LEMONAID claims and grids.

Yellowknife, and north of Slemon Lake (Fig. 8-30).

HISTORY

Ground currently held as the JEAN, LEMON and LEMONAID claims has been staked by various companies since 1939 (Table 8-7).

The LEMON claim was recorded in May; JEAN 1-5 in September; and LEMONAID in October of 1981.

DESCRIPTION

The regional geology is shown in Figure 8-30. Lord (1942) described the geology of the Snare River and Ingray Lake map areas, for which he prepared maps at 1:253,440.

CURRENT WORK AND RESULTS

THE LEMONAID and JEAN claims were staked after geological mapping and prospecting on the LEMON claims and surrounding area in 1981.

Geological mapping at 1:11,750 revealed isoclinally folded metagreywackes interbedded with banded iron formation. The iron formation hosts gold (the SAP showing) associated with magnetite and sulphides. A detailed geological map was made of the SAP showing (1:2000 scale of Grid A, Fig. 8-33). Ninety-three samples were taken and analyzed

for gold, silver, copper, lead and zinc. Anomalous gold concentrations are associated with the iron formations.

In 1982, magnetometer and VLF-EM surveys over Grid B in 1982 (Fig. 8-33) showed the iron formations give rise to magnetic highs that can be traced across the claims. VLF results were inconclusive.

BETAM CLAIMS

Noranda Exploration Co. Ltd.	Gold	
4 - 2130 Notre Dame Ave.	86 B/3	
Winnipeg, Man., R3H OK1	64^{0}13'N,115^{0}05'W	

REFERENCES

Seaton (1984); Tremblay and others (1953).

DIAND assessment report 081625.

PROPERTY

BETAM.

BETAM 2-4.

LOCATION

The claims are 200 km north-northwesterly of Yellowknife on the eastern side of Indin Lake (Figs. 8-30, 8-30a).

HISTORY

Gold was first discovered in the region in the late 1930's and most of the area was staked by the early 1940's. Ground currently held as the BETAM claims has been staked under various names and by various companies since then; as, for example, the VAN 1-36 claims, staked by Freeport Canadian Exploration Ltd. in 1970. Several of the VAN claims lapsed in 1976; the rest in 1980. A more detailed history is given by Seaton (1984).

The BETAM claim was recorded by Noranda in May, 1981; the BETAM 2-4 claims in September, 1981.

DESCRIPTION

The regional geology of the claims is shown in Figures 8-30 and 8-30a. Tremblay and others (1953) have compiled a more detailed map at 1:63,360.

The claims are predominantly underlain by mafic volcanics in contact with sediments to the east near Damoti Lake and to the west near Indin Lake. Numerous granitic dykes and quartz-feldspar porphyry dykes intrude the volcanics.

CURRENT WORK AND RESULTS

In 1982, follow-up geological mapping and prospecting were carried out over areas of interest discovered during the 1981 exploration project (Seaton, 1984). The felsic intrusive and felsic volcanics, near a lake informally known as Andy Lake, and the rhyolite on BETAM 4 were re-examined (Fig. 8-34).

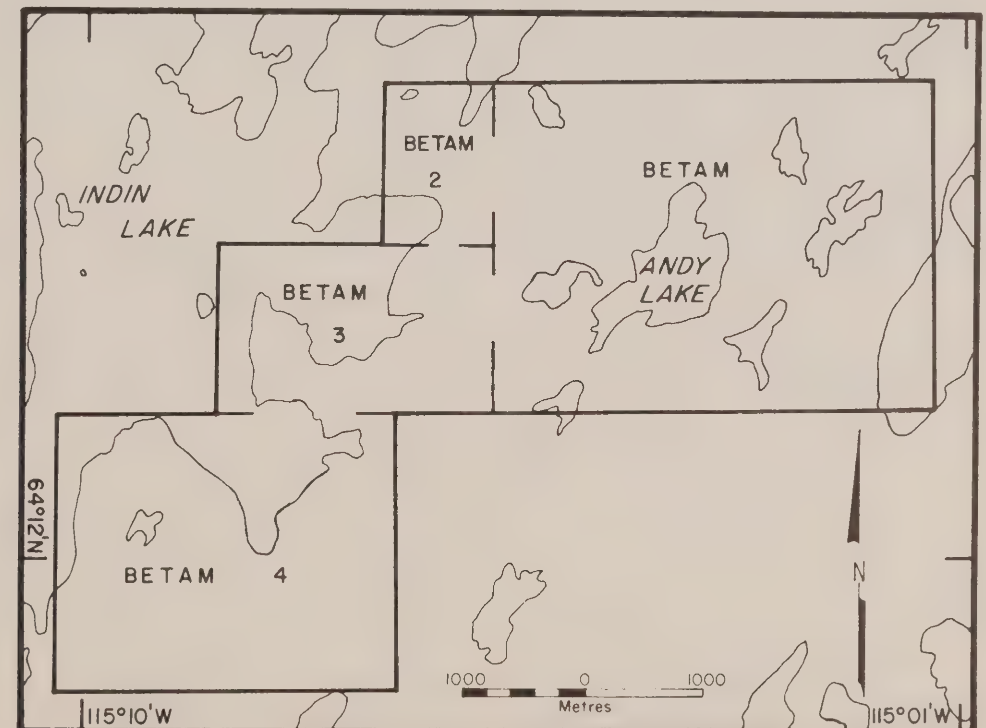


FIGURE 8-34: The BETAM 1-4 claims.

One hundred and eighteen rock samples were taken from the BETAM claims and surrounding area and analyzed for gold, silver, copper, lead and zinc. The samples ranged from less than 5 to 3428 ppb Au. Eleven of the best anomalies (greater than or equal to 100 ppb Au) are associated with quartz veins and volcanics around Andy Lake. Copper, lead and zinc anomalies coincided with gold anomalies. No gold occurrences of economic importance were discovered.

EAEC CLAIM

Treasure Island Res. Corp.	Gold
55A Powell St.	86 B/6
Vancouver, B.C., V6A 1E9	64°29'30"N,115°07'30"W

REFERENCES

Lord (1942, 1951); Padgham and others (1978).
DIAND assessment report 081680.

PROPERTY

EAEC 1.

LOCATION

The claim is 230 km north-northwesterly of Yellowknife on Treasure Island in Spider Lake (Figs. 8-30, 8-30a, 8-35).

HISTORY

The property was formerly staked as part of the FLY No. 1 claim group, which was first recorded in 1945 by Trans-American Mining Corporation Ltd. In 1946 these claims were acquired by Spinet Mining Company Ltd., which later became Spinet Gold Mines Inc. (Lord, 1951). In 1969, the claims were re-staked by J. Mason as the DAN group and were later transferred to Treasure Island Resources (Padgham and others, 1978).

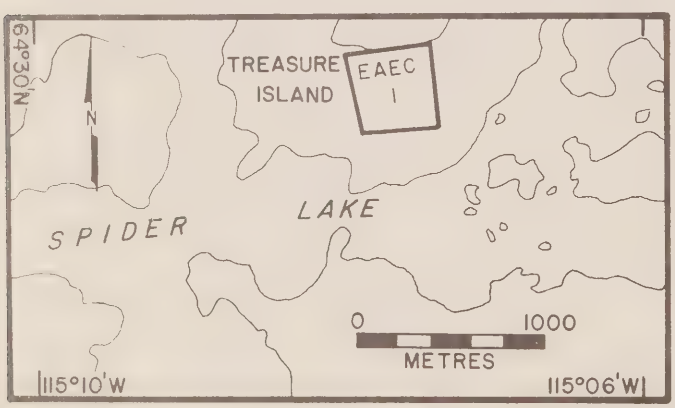


FIGURE 8-35: The EAEC claim on Treasure Island.

The EAEC 1 claim was recorded in October, 1978.

DESCRIPTION

The regional geology of the area is shown in Figures 8-30 and 8-30a. A map at 1:253,440 has also been produced by Lord (1942).

CURRENT WORK AND RESULTS

The claim was geologically reconnoitred in the spring of 1983. The predominant rock type is an amphibolite schist of Archean age; part of the Yellowknife Supergroup series. No gold-bearing quartz veins were observed.

KIM CLAIMS

Comaplex Res. Intern'tl Ltd.	Gold
901, 1015 Fourth St. S.W.	86 B/6
Calgary, Alta., T2R 1J4	64°19'30"N,115°14'W

REFERENCES

Lord (1951); Seaton (1984); Stanton (1947); Stanton and others (1954).
DIAND assessment report 081698.

PROPERTY

KIM 4, 5.

LOCATION

The claims are 215 km north-northwesterly of Yellowknife, north of Indin Lake (Figs. 8-30, 8-30a).

HISTORY

There has been intermittent gold and copper-zinc exploration in the area since the 1930's. Much of the work done on the claims was by Lexindin Gold Mines Ltd. in the 1940's (Stanton, 1947; Lord, 1951). The history of the KIM claims is summarized further by Seaton (1984).

The claims were recorded in February, 1981.

DESCRIPTION

The regional geology is shown in Figures 8-30 and 8-30a. Stanton (1947) and Stanton and others (1954) have mapped the area at 1:31,680 and 1:63,360 scales respectively. The KIM 4, 5 claims are underlain by rocks of the Yellowknife Supergroup. Mafic to intermediate volcanics dominate overall, and are in contact with tuffaceous sediments, greywackes and slates. The north-central part of the KIM 4 claim is underlain predominantly by dacites and rhyolites.

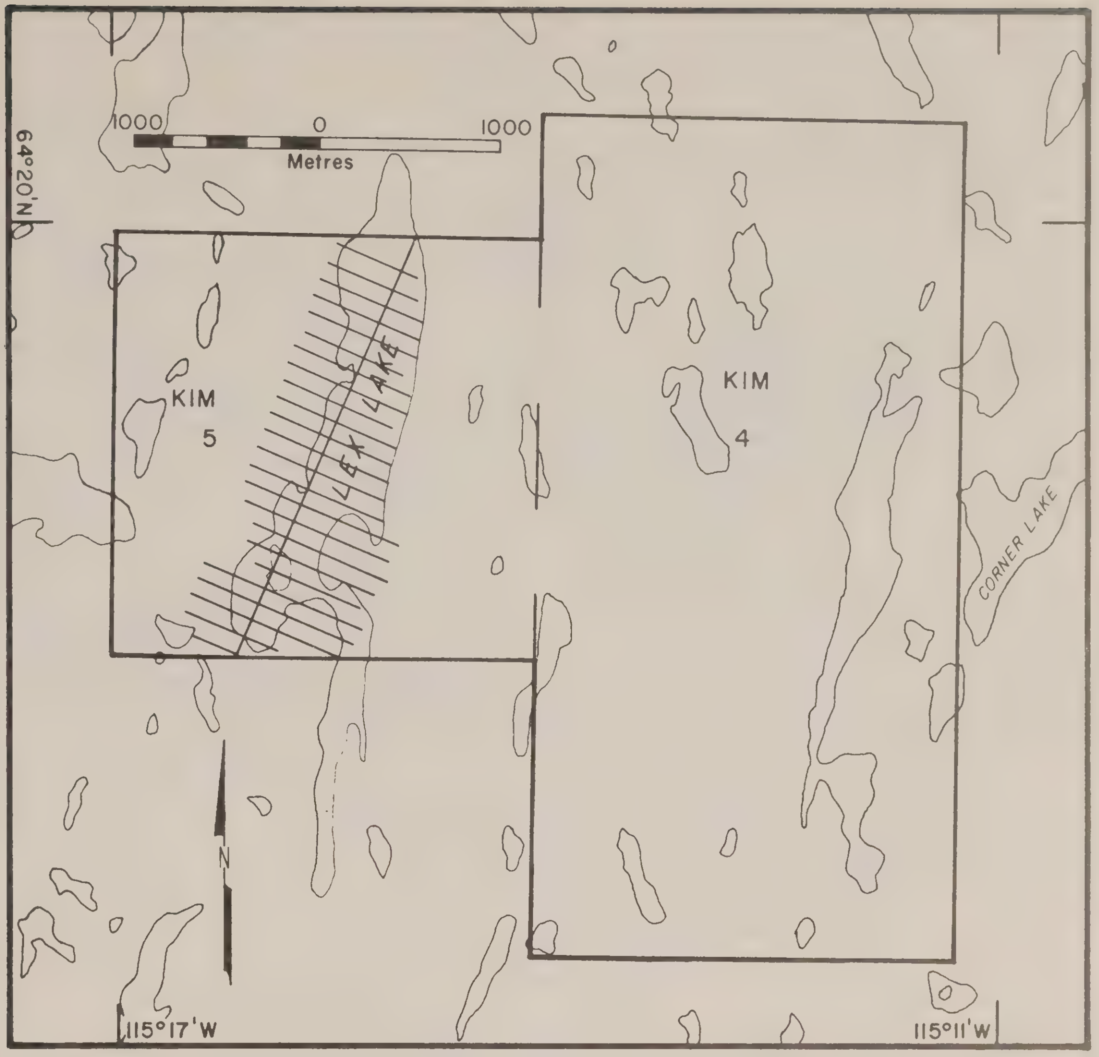


FIGURE 8-36: The KIM claims with geophysics grid.

CURRENT WORK AND RESULTS

Three geophysical surveys: proton magnetometer, VLF-EM, and Max-Min II horizontal loop, were conducted over the KIM 5 claim in the winter of 1983. The magnetometer and VLF-EM surveyed an 18.1 line km grid across Lex Lake (Fig. 8-36). The Max-Min survey covered the best conductors defined by the VLF.

The surveys identified three anomalies, all in the southern part of the grid. One of the anomalies, a magnetometer high associated with two parallel VLF conductors, appears to be cut by a northwesterly trending fault.

YELLOWKNIFE SUPRACRUSTAL BASIN

The Yellowknife Basin (Figs. 8-37, 8-38) as defined by Padgham (1981) includes marginal volcanic belts (including the Yellowknife and Beaulieu River-Cameron River Volcanic Belts) and an extensive area of turbidites deposited distally to the volcanic belts. The basin includes granitoid plutons, the larger ones having lobate outlines. The basin is bordered by Great Slave Lake to the south and gneissic terrain to the north.

The volcanic belts marginal to the basin host gold deposits and silver-base metal deposits. The turbidite sediments that fill most of the basin and the granitic rocks that intrude them host gold, quartz and rare metal pegmatites.

Work done in this area is listed below and in Table 8-1.

FIGURE 8-37: Regional geology and properties in the Yellowknife and Hearne Lake areas.

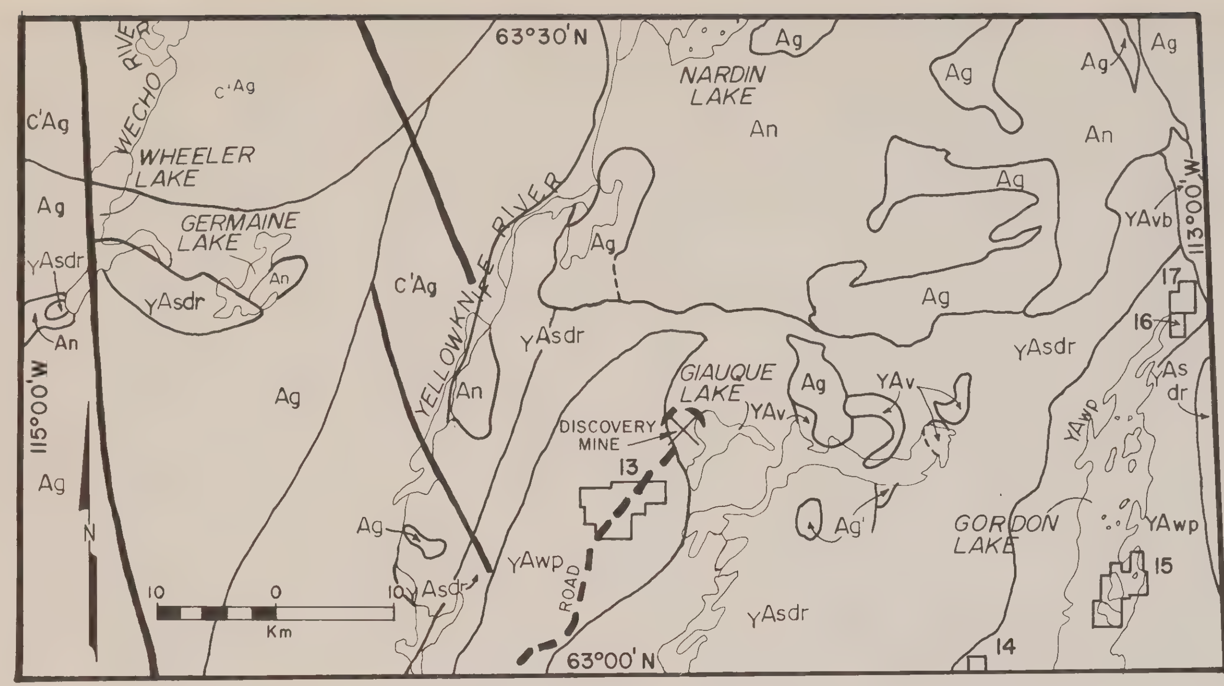


FIGURE 8-38: Regional geology and properties in the Giaque Lake (Discovery Mine) and Gordon Lake areas. Geological symbols are the same as for Figure 8-37.

PROPERTIES

1. BLAKE
2. TA, TER claims
3. COVE, TABÉ, TCS claims
4. Thompson-Lundmark Mine Lease area
5. MAC
6. AM
7. JIM
8. MAHE
9. MQ-001
10. REG, RGE 2
11. LUCKY
12. NEGUS, PRW, PRWX, CAGEX fraction
13. JAKE, GREENLEE claims
14. CHRIS 1, 2
15. CATHY, GOO, JOE, LABOR, PAT claims
16. JANE
17. VEN

LEGEND FOR FIGURES 8-37 AND 8-38

(Geology by McGlynn, 1977)

PROTEROZOIC

Ay, Aga	Syenite, alkaline granite. May be younger than some Aphebian sedimentary sequences

ARCHEAN

Ag'	Late or post tectonic granodiorites and quartz monzonites
Ag	Quartz diorite, granodiorite, quartz monzonite and granite. In part porphyritic. Granitic rocks undivided
An	Granitic gneiss and migmatite and mixed gneisses involving Yellowknife Supergroup rocks
Ab	Gabbro, anorthosite, diorite and minor ultramafic rocks

YELLOWKNIFE SUPERGROUP

YAva'	Acidic lava, tuff, ash flow tuff
YAsdr	Cordierite-andalusite-bearing knotted schists and other metamorphic equivalents of Yellowknife Supergroup sedimentary rocks
YAwp	Greywacke, mudstone, turbidites. Includes minor quartzite, conglomerate, limestone and tuff
YAva	Acidic lava, tuff, agglomerate and ash flow tuff with minor undifferentiated basic volcanic rocks
YAvb	Basic to intermediate lava, tuff, agglomerate with minor undifferentiated acidic volcanic rocks

cAg	Complex of plutonic gneisses, commonly of tonalite composition, in part cataclastic, that are basement to Yellowknife Supergroup. May include some younger plutonic rocks

BLAKE CLAIM

M.L. Senkiw	Gold
Box 2614	85 I/1
Yellowknife, N.W.T., X1A 2P9	$62^{o}12'N, 112^{o}24'W$

REFERENCES

Henderson (1976); Rowe (1952); Seaton (1978, 1983b).

DIAND assessment report 081637.

PROPERTY

BLAKE 1.

LOCATION

The claim is 105 km east-southeasterly of Yellowknife (No. 1 on Fig. 8-37) at the eastern end of Blatchford Lake.

HISTORY

Gold was discovered in the Blatchford Lake area in 1938. In 1942, tantalum and niobium were discovered to the east and southeast of the present BLAKE 1 claim (Rowe, 1952). Numerous claims were staked in the 1950's. During the last few years, work in the Blatchford Lake area has been predominantly for beryllium, tantalum, niobium and lithium (Seaton, 1978, 1983b).

The BLAKE 1 claim was recorded in August of 1982.

DESCRIPTION

The regional geology is shown in Figure 8-37. Henderson (1976) has compiled the geology of the Hearne Lake (85 I) and Yellowknife (85 J) areas at 1:125,000. About half the claim area is covered by water.

CURRENT WORK AND RESULTS

In the summer of 1982, the claim was prospected and 16 samples taken for gold analyses. Results indicate that low-grade concentrations of gold are present in scattered zones and are associated with carbonate breccia hosted in alkali gabbros and with quartz veins in Archean metasediments.

TA, TER CLAIMS

Terra Mines Ltd.	Gold
#202, 7608 - 103rd St.	85 I/7
Edmonton, Alta., T6E 4Z8	$62^{o}20'30''N, 112^{o}44'30''W$

REFERENCES

Henderson (1976); Seaton (1978, 1984).

DIAND assessment report 081694.

PROPERTY

TA 1-8, TER 1, 2.

LOCATION

The claims are 85 km east-southeasterly of Yellowknife on the northern side of Bullmoose Lake (Fig. 8-37).

HISTORY

The TA claims were staked in 1939 for Consolidated Mining and Smelting Limited (Cominco). In 1968, Duke Mines Ltd. optioned the property. The TA 1-6 claims were recorded by Duke Mining Ltd. in April of 1976. Terra Mines Ltd. acquired ownership of the claims in 1981. TA 7 and TA 8 were recorded in August and October of 1983 respectively. The TER 1 claim was recorded in October, 1980 and TER 2 in April, 1983. The history of the claims is given in more detail by Seaton (1978, 1984), who cited additional references.

DESCRIPTION

The regional geology is shown in Figure 8-37. Henderson (1976) compiled the geology of the Hearne Lake (85 I) and Yellowknife (85 J) areas at 1:125,000. The claim group is underlain by isoclinally folded, knotted schists and greywackes of the Yellowknife Supergroup.

CURRENT WORK AND RESULTS

In the summer of 1983, a soil geochemistry survey was undertaken on the TER 1 claim to outline potential gold deposits. A test grid for orientation purposes was set up on the TA 3 claim over zones with gold-bearing quartz veins (Fig. 8-39), with lines at 50-m spacing and sample intervals of 5 m. A total of 36 samples were taken and analyzed for gold, silver, zinc, copper, arsenic and mercury. Gold, copper, zinc and arsenic were found to be good pathfinders for gold.

Another grid was then set up on the TER 1 claim (Fig. 8-39) with 50-m line spacing. Soil samples were taken at 15-m intervals along the lines. One hundred and sixty-five samples were taken and analyzed for gold, copper, zinc and arsenic. Numerous single-element anomalies were outlined, but no multi-element anomalies. Several arsenic anomalies were found in the northwestern part of the grid. No potential ore zones were indicated.

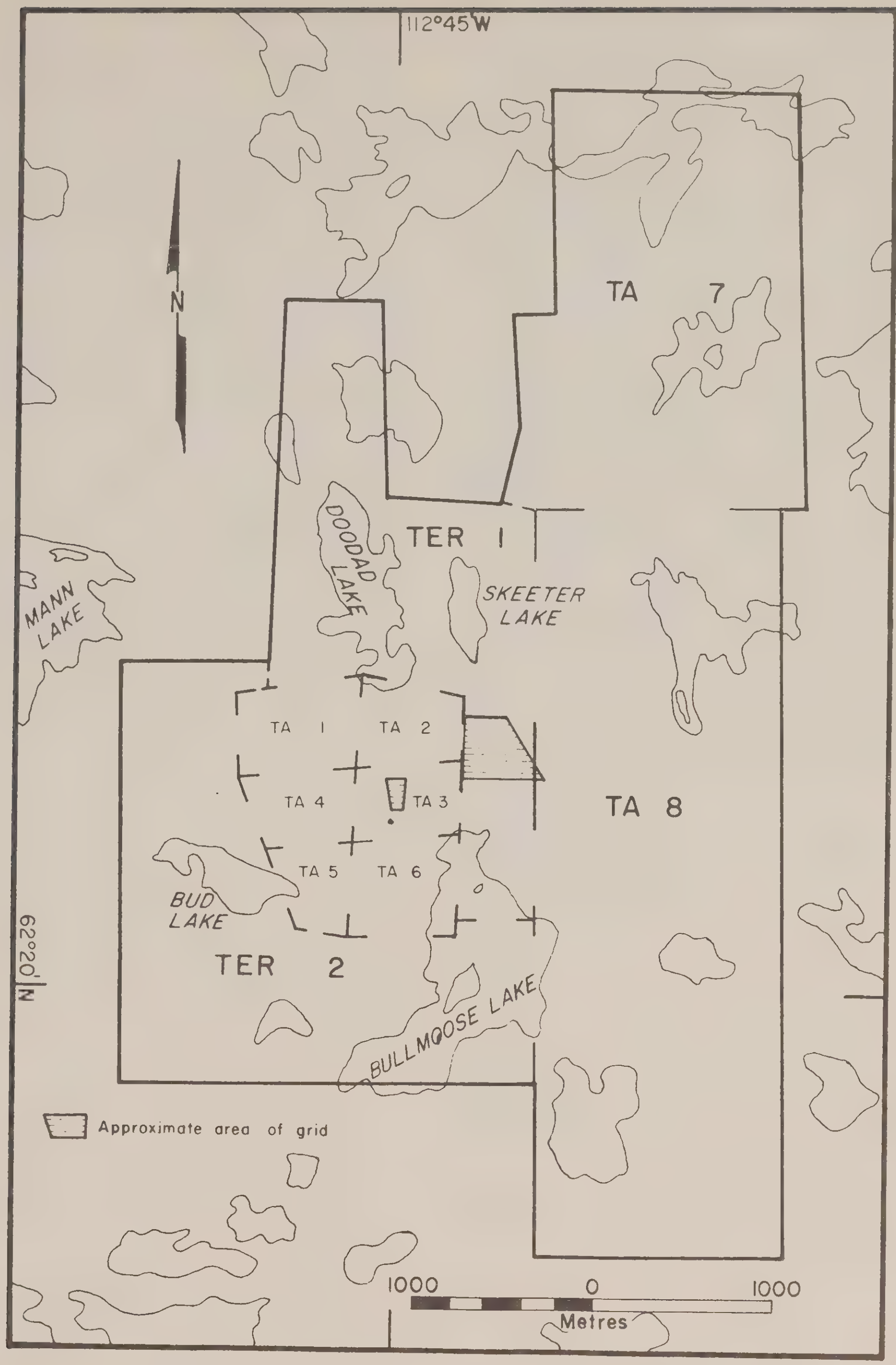


FIGURE 8-39: The TA and TER claims with cross-hatched soil geochemistry grid areas.

COVE, TABE, TCS CLAIMS

Tantalum Mining Corp.
of Canada Ltd.
P.O. Box 2000
Bernic Lake, Man., ROE OGO

Tantalum, Tin
85 I/11, 12
62°38'30"N,113°30'W

REFERENCES

Henderson (1976); Lord (1951).
DIAND assessment report 081683.

PROPERTY

COVE 1, TABE, TCS 1,2.

LOCATION

The claims (No. 3 on Fig. 8-37) are 50 km east-northeasterly of Yellowknife.

HISTORY

According to old claim maps, the TCS and COVE

claims cover ground originally staked as parts of the GLID, REDOT, MACK, JERRY, WACO, ACME and DOT claims, among others; all staked in the late 1930's or early 1940's upon the discovery of gold in the area in 1938. In 1944 the Waco pegmatite sill was discovered on what is now the TCS 2 claim. Nothing was done on the Waco sill until 1961, when Thompson-Lundmark Gold Mines Ltd. explored it for tantalum and columbium. In August, 1981 and October, 1982, respectively, the TCS and COVE claims were recorded for Tantalum Mining.

The discovery of the Freda No. 1 pegmatite dyke, in 1944, led to the staking of the FREDA No. 1 claim (now TABE) by E. Sutherland. In 1945, stripping and blasting were undertaken over the dyke. Later that year Northern Tantalum and Rare Metals Ltd. acquired the claim, and a small milling operation was set up in 1946. By 1947, all significant work had stopped (Lord, 1951). In 1968 J.S. Turner examined the dyke.

The present TABE claim was recorded in August 1979 by Cominco Ltd. A joint venture agreement was held between Tantalum Mining and Cominco with respect to the TABE claim.

REGIONAL GEOLOGY

The regional geology is shown in Figure 8-37. Henderson (1976) has also done a compilation of the area at 1:125,000. The claims are underlain by deformed and metamorphosed Archean mafic volcanics, greywackes, shales and argillites of the Yellowknife Supergroup. These rocks are intruded by granitic stocks and associated northwesterly striking pegmatites.

CURRENT WORK AND RESULTS

In 1982 and 1983, two lithogeochemical surveys were undertaken over two grids. The first grid concentrated on the area covering the main pegmatite

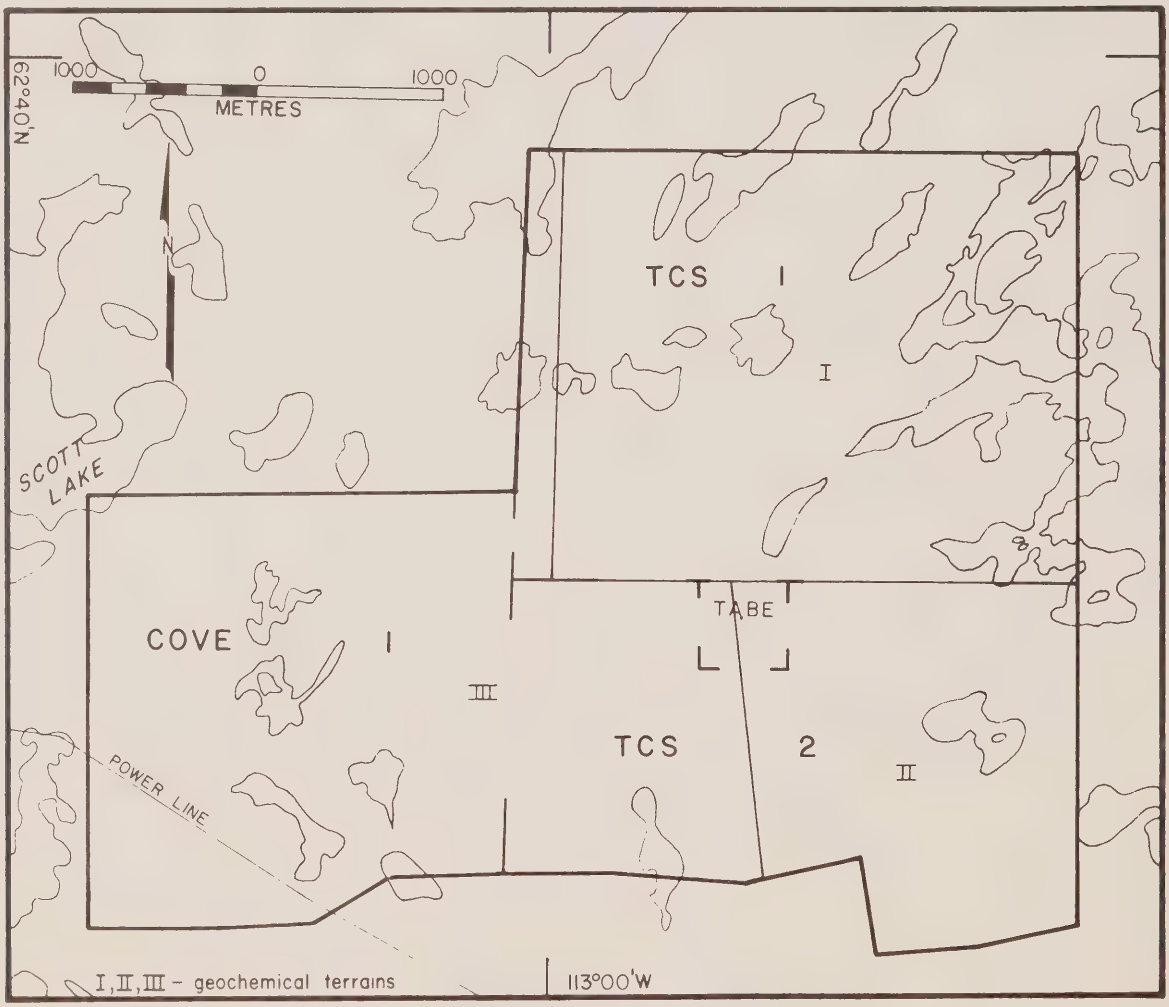


FIGURE 8-40: The COVE, TABE and TCS claims showing geochemical terrains.

bodies on the TCS 2 and TABE claims. The second grid overlapped the first and extended beyond it. Samples were taken every 91.4 m(300 ft) and 76.2 m (250 ft) respectively at 304 m (1000 ft) line spacing. The samples were taken of the country rock and analyzed for lithium for the purpose of identifying lithium aureoles caused by metasomatism during the intrusion of tantalum-bearing pegmatites.

Three geochemical terrains were outlined by the survey (Fig. 8-40). Two of the terrains (most of TCS 1, and TCS 2 and TABE east of 0+00 baseline) contained relatively few and isolated anomalies. The third terrain, covering the remainder of the claims, contained anomalies that followed a northerly trend believed related to structural features. Eight relatively strong anomalies were outlined, some caused by outcropping pegmatites.

Some of the pegmatites were sampled. A total of twenty-five samples were analyzed for tantalum and tin. The assays obtained were 0.028% Ta_2O_5 and 0.472% SnO_2 .

MAC CLAIM

J.R. Woolgar	Gold
P.O. Box 128	85 I/12
Yellowknife, N.W.T., X1A 2N1	62°35'N,113°34'30"W

REFERENCES

Henderson (1976).

DIAND assessment report 081691.

PROPERTY

MAC 1.

LOCATION

The claim is (No. 5 on Fig. 8-37) is 45 km east-northeasterly of Yellowknife and is about 1 km by 1 km in dimension.

HISTORY

Gold was first discovered on the property in 1947 and claims were staked in 1964 by J. Woolgar. These lapsed, as did claims staked in 1968 by Prospectors Mining Group. The MAC 1 claim was recorded in September of 1980.

DESCRIPTION

The regional geology can be seen in Figure 8-37. Henderson (1976) has also completed a compilation of the area at 1:125,000.

CURRENT WORK AND RESULTS

Geological mapping, prospecting and sampling, in June of 1983, researched for and tested a previously reported high-grade gold showing. The claims are underlain by Archean knotted biotite schists of the Yellowknife Supergroup. These sediments are intruded by granitic stocks and numerous pegmatite dykes. Five samples were taken and analyzed for gold. Only low assays were reported.

AM CLAIM

D. Nickerson	Gold
Box 1778	85 I/14
Yellowknife, N.W.T. X1A 2P4	62°56'30"N,113°20'W

REFERENCES

Henderson (1976); McGlynn (1971); Schiller (1965).

DIAND assessment report 081527.

PROPERTY

AM.

LOCATION

The claim is 75 km northeasterly of Yellowknife on the southwest shore of Gordon Lake (Figs. 8-37, 8-41).

HISTORY

The AM claim forms part of the TREACY and AM claims originally staked in 1946 and 1950 respectively. In 1950, trenching, milling and diamond drilling were done by Expander Mines and Petroleum Ltd. In 1962, the area was examined by Giant Yellowknife Mines Ltd. (McGlynn, 1971; Schiller, 1965). The AM claim was recorded by D. Nickerson in March, 1982.

DESCRIPTION

The regional geology of the area can be seen in Figure 8-37. A 1:125,000 compilation of the area has also been done by Henderson (1976).

CURRENT WORK AND RESULTS

Three showings of gold-bearing quartz veins, hosted by Yellowknife Supergroup greywackes and slates, were examined and sampled in August of 1982. A total of twenty-nine samples were taken and analyzed for gold and silver.

LUCKY CLAIM

Aber Resources	Gold
675 West Hastings St.	85 I/16
Vancouver, B.C., V6B 1N2	$62^{o}51'N,112^{o}20'W$

REFERENCES

Henderson (1976); Lord (1951); Seaton and Hurdle (1978).

DIAND assessment reports 081678, 017324.

PROPERTY

LUCKY.

LOCATION

The claim (No. 11 on Fig. 8-37) is 115 km east-northeasterly of Yellowknife. It is about 1 km by 1 km in dimension.

HISTORY

The LUCKY claim covers a portion of an area formerly known as the ALICE claim group. These claims were staked in 1938 when gold was first discovered on the property. Since then, the claims have been worked by various companies and drilling, trenching and mining carried out. The former Sunset Yellowknife Mine operated here from 1945 to 1947. A more detailed history of the ALICE claims is given by Lord (1951) and Seaton and Hurdle (1978). The present LUCKY claim was recorded in October of 1981 and is owned by J. Arden of Yellowknife from whom Aber Resources optioned the claim.

DESCRIPTION

The regional geology of the area is shown in Figure 8-37. Henderson (1976) compiled the geology of the area at 1:125,000. A more detailed map was made by Giant Yellowknife Mines Ltd. in 1966 at 1:400 (DIAND assessment report 017324). The claim is underlain by northerly trending mafic to intermediate volcanic flows, agglomerates and tuffs and thin beds of pyritic, cherty, felsic tuffs.

CURRENT WORK AND RESULTS

An evaluation of the property was made in June of 1983. Previous reports and results were examined. Seven samples from quartz veins in shear zones were taken and analyzed for gold. Low assays were reported.

GREENLEE, JAKE CLAIMS

Noranda Exploration Co. Ltd.	Gold
4 - 2130 Notre Dame Ave.	85 O/1; 85 P/4
Winnipeg, Man., R3H OK1	$63^{o}06'30"N,114^{o}00'W$

REFERENCES

Tremblay (1952).

DIAND assessment report 081542.

PROPERTY

GREENLEE; JAKE 10-13.

LOCATION

The claims (No. 13 on Fig. 8-38) are 75 km north-northeasterly of Yellowknife at and to the north and east of Morris Lake.

HISTORY

Gold was first discovered in the area in 1944. From 1944 to 1950, the area was prospected, geologically mapped, trenched and diamond drilled. Various companies conducted the exploration work and is summarized in Table 8-8.

In 1954 the assets of Greenlee Mines Limited were taken over by New Athona Mines Ltd. A more detailed history of the claims is given by Tremblay (1952).

In 1972 the POOL 1-6 claims were recorded by Precambrian Mining Services Limited, with the POOL 7,8 claims being recorded in 1973. These claims lapsed and were re-recorded as the GREENLEE claim for Bittern Investments Limited in August, 1979. In September, 1981, the claim was optioned to Noranda Exploration Co. Ltd.

TABLE 8-8: SYNOPSIS OF THE CLAIMS AND COMPANIES IN THE JAKE-GREENLEE PROPERTY REGION FROM 1944-1950

1944 - 1950

Present Claim	Claim Name	Company
JAKE 10,11,12 northern parts	TRI 1-18 and WALLIE 1-12	CIRCLE YK Mines Ltd.
JAKE 11	part of SB 1-12 claims and LUCKY 1-8	Beauregard YK Mines Ltd. Northland (1940) Mines Ltd.
JAKE 12, along the north shore of Morris Lake	RB 1-9, later restaked as POOL 9-11 claims	Centrix YK Mines Ltd. Greenlee Mines Ltd.
JAKE 12 (east and west central part) Greenlee	POOL 1-18, 12-18	Greenlee Mines Ltd.
JAKE 12,13 south-easterly of Morris Lake	STAR 1,3,13-15	Prospect Street Syndicate
JAKE 13	part of SB 1-12 claims	Beauregard YK Mines Ltd.

The JAKE 10-13 claims were recorded in April, 1981.

DESCRIPTION

The regional geology of the claims is shown in Figure 8-38. Tremblay (1952) has also mapped the area at 1:24,000. The claims are underlain predominantly by northeasterly striking metagreywackes and slates of the Archean Yellowknife Supergroup. A narrow belt of mafic metavolcanics or metadiabases trends northeasterly through the claims from Morris Lake. These metavolcanics/diabases are known to be gold-bearing at the Discovery Mine.

CURRENT WORK AND RESULTS

Ground magnetometer and VLF-EM surveys were conducted on the claims and a grid (JAKE C grid) was cut with a 5-km-long baseline (Fig. 8-41) in the spring of 1982. Stations for both surveys were taken at 25-m intervals.

A total of 28 magnetic anomalies and 32 VLF-EM anomalies were interpreted. Four of the magnetic highs and 3 of the VLF highs may possibly be related to gold and sulphide-bearing metabasalts or metadiabases.

CHRIS CLAIMS

Hidden Lake Gold Mines Ltd.	Gold
P.O. Box 2670	85 P/3
Yellowknife, N.W.T., X1A 2P9	$63^{0}00'30"N, 113^{0}24'30"W$

REFERENCES

Baragar and Hornbrook (1963); Lord (1951); Moore and others (1951); Padgham and others (1976).

DIAND assessment report 081543.

PROPERTY

CHRIS 1,2.

LOCATION

The claims (No. 14 on Fig. 8-38) are 80 km northeasterly of Yellowknife on the south side of Murray Lake.

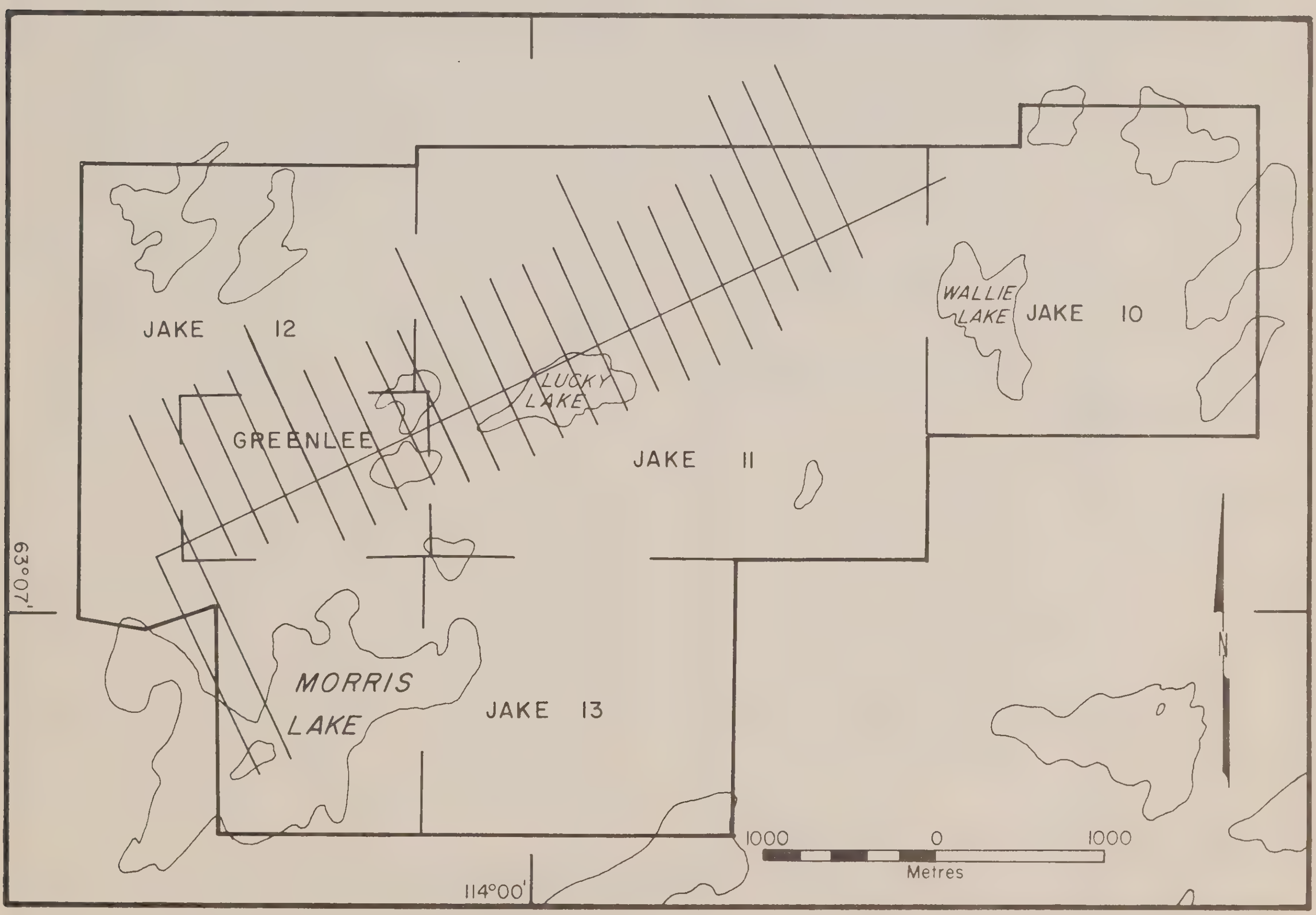


FIGURE 8-41: The JAKE and GREENLEE claims showing geophysics grid.

HISTORY

The claims were first staked as the PAN claims in 1937. From 1937 to 1940, numerous pits and trenches were dug, and a shallow shaft sunk (Lord, 1951). In 1957 and 1961, the claims were staked as the BAIRN claims, and trenches were re-opened and extended (Baragar and Hornbrook, 1963; Padgham and others, 1976). In 1970 the claims were staked as the MSSL claims by S. Otto and then transferred to North Star Mines Ltd. in 1972. The claims lapsed in 1977. The present CHRIS claims were recorded in August, 1980.

DESCRIPTION

The regional geology of the claims is shown in Figure 8-38. The geology of the area has also been compiled at 1:253,440 scale by Moore and others (1951).

CURRENT WORK AND RESULTS

The claims were prospected and old showings re-sampled and assayed for gold in the fall of 1982. Five showings (Zones 1, 3, 5, 6, 7) were examined; all, with the exception of Zone 1, were sampled (Fig. 8-43). A total of thirty samples were taken. The showings consist of gold-bearing quartz in veins, fractures, open space fillings and irregular masses, hosted in tight, isoclinally folded, Archean greywackes, slates and argillites of the Yellowknife Supergroup.

In the past, assays up to 58.3 g/tonne Au over 1.2 m have been reported for Zone 1 and up to 123.1 g/tonne A for Zone 7.

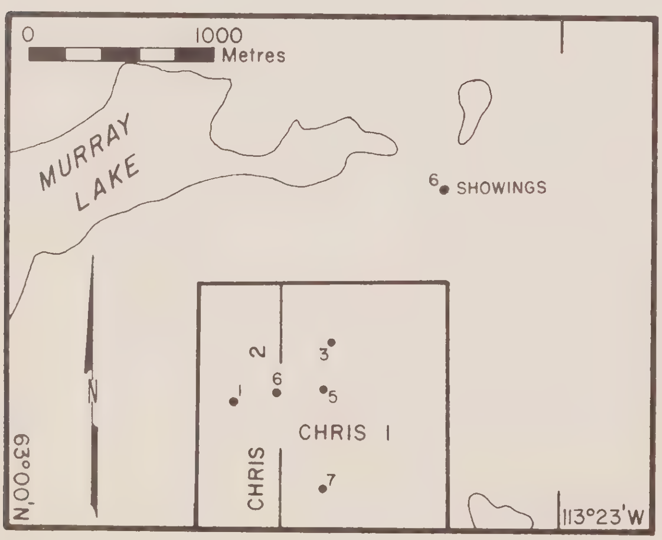


FIGURE 8-42: The CHRIS claims and showings examined.

CATHY, GOO, JOE, LABOR, PAT CLAIMS

Burnt Island Gold Ltd. — Gold
801, 837 West Hastings St. — 85 P/3
Vancouver, B.C., V6C 1B6 — $63^{0}04'30"N, 113^{0}08'30"W$

REFERENCES

Baragar (1962); Moore and others (1951); Schiller and Hornbrook (1964); Seaton (1984).

DIAND assessment reports 081544, 017377.

PROPERTY

CATHY 1-4, GOO 1-7, JOE 1, LABOR 1, PAT.

LOCATION

The claims (No. 15 on Fig. 8-38) are 95 km northeasterly of Yellowknife in the central part of Gordon Lake.

HISTORY

The various claim areas have had different histories, as follows:

GOO claims: Gold was first discovered on the property in 1936 and was staked as the ARDOGO claims. In the 1940's the ground was re-staked as the GOOD HOPE and part of the EAST HOPE groups and the TEEN claim. The northern part of the property was staked as the TICK group. In 1958, the GOO 1-9 and TRE 10 claims were staked, with all but GOO 4, 5 lapsing by 1969. In 1969 a twenty-one year lease was applied for comprising the GOO 4, 5 claims and was received in 1972. The GOO 1, 2 claims were re-staked in 1973, but again lapsed. In February, August and September of 1980 the GOO 1, 2, 3, 6, 7 claims were recorded and transferred to Burnt Island Gold Ltd. in February, 1981 (Seaton, 1984; Schiller and Hornbrook, 1964).

JOE, LABOR AND CATHY claims: In the 1940's the NORTHRUP claim group was staked over what is now the JOE claim; and the HAZEL claims covered the area of the present CATHY and LABOR claims (according to old claim maps). In 1958 and 1959, these claim groups were re-staked as the DARK and EGAR claims. The DARK claims lapsed in 1976 (Baragar, 1962).

The JOE claim was recorded in August, 1980, LABOR 1 in September, 1980 and CATHY 1-4 in August, 1981. By the end of 1981, all of the claims had been transferred to Burnt Island Gold Ltd.

PAT claim: The PAT claim forms part of what was the GOLDFLAKE and LAURA claims in the 1940's (according to old claim maps). In 1961, the claims were re-staked as the GY claims and transferred to

Giant Yellowknife Mines Ltd. (DIAND assessment report 017377).

The present PAT claim was recorded in March, 1981 for Burnt Island Gold Ltd.

DESCRIPTION

The regional geology is shown in Figure 8-38. A map at 1:253,440 has also been compiled by Moore and others (1951). The claims are underlain by Archean slates, argillites and greywackes of the Yellowknife Supergroup.

CURRENT WORK AND RESULTS

Geological mapping, sampling and diamond drilling tested the claims in the summer of 1982.

Detailed geological mapping was carried out at 1:5,200 scale over the islands on the claims. Quartz systems were mapped at 1:200 and the shaft on GOO 5

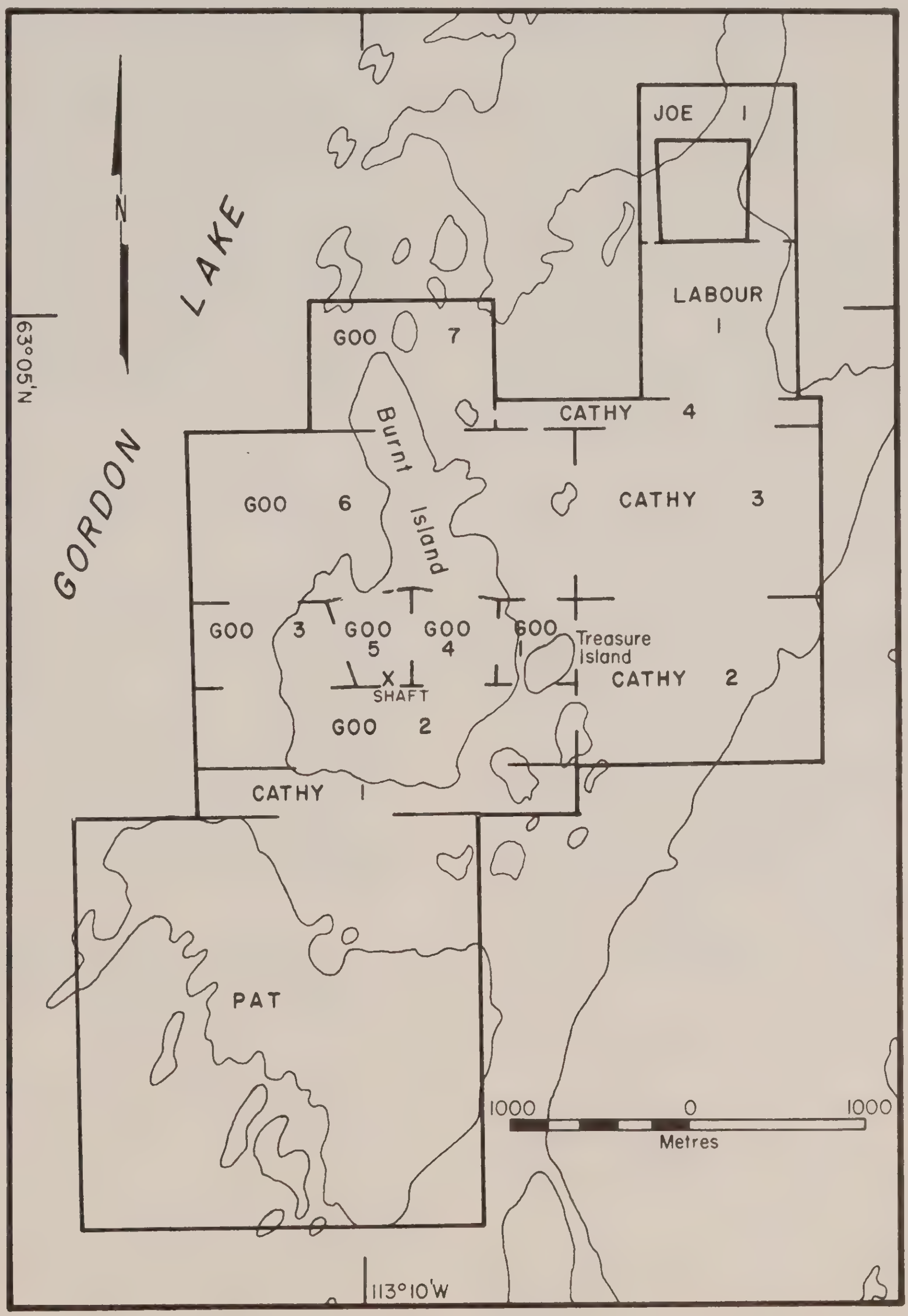


FIGURE 8-43: The CATHY, GOO, JOE, LABOR and PAT claims.

was mapped at 1:20 (Fig. 8-43). Numerous quartz veins were found on both Green and Treasure Island, usually occupying troughs and limbs of synclinal folds or associated with drag folds. In the Shaft Zone, good gold concentrations were reported in a vein cutting across the nose of a steeply plunging synclinal fold.

Sampling of quartz veins and previously trenched areas revealed no economic gold concentrations.

Two holes were drilled in the Treasure Island area (Fig. 8-44). One hole intersected two small quartz veins carrying visible gold. Sampling of the core revealed sub-economic amounts of gold.

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